INVESTIGATION ON THE FREE ENERGY MAGNET MOTORS

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A project report submitted in partial fulfilment of the requirements for the award of the degree of Bachelor (Hons.) of Mechatronics Engineering

Faculty of Engineering and Science
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May 2011

DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

Signature : ____________________________

Name : ____________________________

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APPROVAL FOR SUBMISSION

I certify that this project report entitled **"INVESTIGATON ON FREE ENERGY MAGNET MOTORS"** was prepared by **NEO TENG YI** has met the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of Eng. (Hons.) Mechatronics Engineering at Universiti Tunku Abdul Rahman.

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Supervisor : Dr. Stella Morris

Date : ___________________________

Specially dedicated to
my beloved mother and father

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INVESTIGATION ON FREE ENERGY MAGNET MOTORS

ABSTRACT

The main title of this project is Investigation on Free Energy Magnet Motor where the main objective is to investigate on the feasibility of the magnet motor which used its natural properties which are attraction and repulsion of the magnet poles to create a perpetual motion which can be harnessed to do a useful work. The permanent magnets have invisible and continuous power where it can attract the iron or other specific kind of metal with the energy flow which allows the permanent magnet to defy the gravity for years. Therefore, it is believed that the free energy can be extracted from the permanent magnets by arranging the magnets in special configuration. This investigation project was proposed by performing paper research, experiments, hardware prototype development and software simulation. In this report, the author had focussed his research on the software simulation. Howard Johnson's motor which is a patented free energy device was simulated and the simulation result of the curvature magnets with sharp trailing edge was found to have the difference of magnetic flux between the North and South Poles. This phenomenon was believed is the main power source that drives the Johnson's motor perpetually. Besides that, several simulations have been done on the permanent magnets with linear and circular configuration. The simulation result of magnets in linear configuration was calculated doing a positive work. However, the magnets in circular arrangement was found having a net loss of work which concluded that the motor cannot rotate on its own without any external force applied. Another achievement was the simulation of the Halbach Array where the circular configuration of this magnet array was doing a positive work which means the motor can rotate by itself without external force applied. Throughout the investigation, the free energy magnet motor was an uncertain fact until current state due to a lot of limitation and obstacles. However, a slight achievement in the simulation result was hoped to be carried in the future research and study.

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LIST OF SYMBOLS / ABBREVIATIONS

F	*Force, Newton (N)*
T	Torque, N.m
d	distance, m
θ	Angular Displacement, Radian
W	Work Done, Joule (J)
B	Magnetic Flux Density, Tesla (T)
H	Magnetic Strength, Gauss

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CHAPTER 1

INTRODUCTION

1.1 Overview

The term "Free-Energy" generally means a method of drawing power from the local environment, without the need to burn a fuel or coal (Kelly, 2010). The author stated that free energy is coming from the local environment that supply to the system where these free energy is indefinite and perpetual. However, the conventional science contradict the method of free energy. The Law of Conservation of Energy is undoubtedly correct when it shows that more energy cannot be taken out of any system than is put into that system.

According to Kelly (2010), the magnet actually does not exert any power at all. Similar like the solar panel does not put effort into producing electricity, the power of a magnet flows from the environment and not from the magnet. The electrical pulse which creates the magnet aligns the atoms inside the iron and creates a magnetic "dipole" which has the same effect that the electrical "dipole" of a battery does. It polarizes the quantum environment surrounding it and causes great streams of energy flow around itself.

This is the reason that magnet can attract the iron or other specific kind of metal with the energy flow that we so called "magnetism". This energy flow allows the magnet to defy the gravity for years on end. This property of magnet is believed that have the capabilities to create an indefinite source of energy. Through the concept of the natural polarity of the magnetic poles that the like poles attract each

other, unlike poles repel each other. The natural repulsion or the repelling characteristics of magnetic waves creates a perpetual motion that is being harnessed by the magnetic devices.

1.2 Introduction

In this project, the author does not have any intention to create or design a successful free energy device; however, the intention as defined is to investigate the feasibility of free energy. Therefore, the main purpose of this project is to carry out an investigation to prove the free energy magnet motor by understanding new science doctrines of free energy theories.

Permanent Magnets have continuous power. This should be obvious as one will support its own weight on the vertical face of a refrigerator, for years on end. Conventional science says that permanent magnets can’t be used as a source of power. However, the reality is that conventional science just doesn’t know the techniques necessary for extracting that power (Kelly, 2010).

The author stated that permanent magnets has continuous power that were disclaimed by conventional science century year ago as the energy (i.e. work) is only done when something actually moves against as a result of force. The energy cannot be extracted without there is being motion.

The Law of Conservative of Energy has also clearly stated that the idea of no more energy coming out of a system than goes into it. In fact, the fridge magnet can be put on a fridge and seem like it will stay there forever with no sign of any power source input. Besides that, when we try to push the like poles of 2 magnets together, seem like the magnets will try to repel each other where there is no power or energy input to the magnets. However, our hands require some energy to against the magnets repelling motion. From these observed facts have stated that the conventional science probably is out of date and need to be upgraded.

Conventional physics says that it is impossible for magnets to provide a primary energy source. However, the free energy magnet motor can be achieved based on the property of magnet which attracting and repelling. Yet thousand of researchers worldwide have been pursuing the task of building a working magnet motor. Many claimed to have achieved this objective. However, none has reached the marketplace yet. Therefore, the author attempted to perform an investigation to justify the authentic of free energy magnet motor achievements claimed by the researchers.

1.3 Aims and Objectives

The main objective of performing this project is to investigate on the free energy magnet motor where the natural repulsion or the repelling characteristic of magnetic waves is believed can creates a perpetual motion is being harnessed by the magnetic motor.

Besides that, this project is aimed to bring the awareness to the public about the development of the new technology which is free energy that can be used to replace the reliability on the non-renewable energy sources such as fossil fuel which is depleted and polluted to the environment.

In addition, we will further our study on the feasibility of the free energy magnet motor by constructing a prototype and performing the software simulation on our project by applying the knowledge and technical skill that we gained and learned throughout our study on the magnet energy.

The aims that we expected to be achieved while carrying the investigation on the feasibility of free energy magnet motor.

- Able to prove the existence of free energy magnet motor which can act as indefinitely and sustainable energy source.

- Able to construct a simple prototype to prove the existence of free energy magnet motor.
- Able to carry several experiments to study the feasible of free energy magnet motor behind the natural properties of permanent magnet.
- Able to discover several new theories that related to free energy term after conducting the investigation and study.
- Able to correct and reclaim the thought of public on the misunderstanding of free energy.

1.4 Motivation

Nowadays, our world has faced with the global warming, greenhouse effect issue which is getting worse and worse. The emission gas of the non-renewable energy sources such as fossil fuel and coal is the main reason for the above environmental issue. Therefore, the development of new energy sources which is clean and non-polluted to the environment is getting more and more demand in our world today. The free energy sources such as magnet energy are adaptable in replacing the non-renewable energy sources. However, the principle of the free energy is still under oppugned as the free energy has infringed the law of conventional science.

This project will be conducting the investigation about feasibility of the free energy using the magnet to create the perpetual motion that lead to useful work which is sustainability and indefinitely.

1.5 Limitation

a) The investigation on the free energy perpetual that we attempted to approach has contradicted several laws of Physics which is a big obstacle for us to perform our project.

b) Lack of budget to perform the experiments that related to permanent magnet as the price to purchase the ferromagnetic material is too high especially the magnet with a various and unique shape.

c) Lack of fundamental knowledge that related to the energy and magnetism theory as our project title requires adequate and firm fundamental knowledge to further our investigation thoroughly.

d) Lack of firm information resources such as journal, book, research paper and etc, as violation of the law of Physics limited the researchers to approach their study on perpetual motion.

e) The informative resources often involve with a lot of conspiracy theories that may doubt us on determining the truth of the information.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

From middle ages to the Renaissance, at pre-1800s year, several perpetual motion devices has been invented and claimed to be working by the inventors. For the example, one of the earliest invention using magnets was proposed by Wilkins. It consists of a ramp with a magnet at the top. The magnet would pull a ball up a slope toward the hole at the top and eventually drop to cycle back to the start. However, this didn't work (Vacca, 2004). Another invention by Gaspar Schott is illustrated by the following figure 2.1:

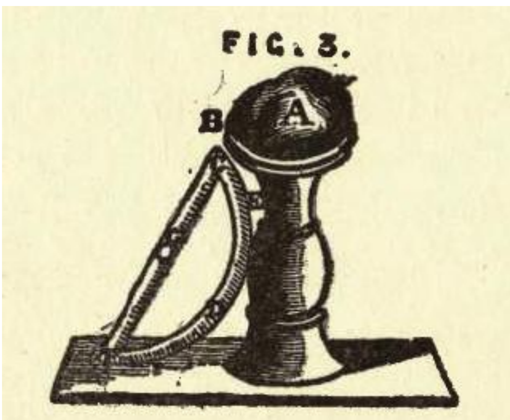

Figure 2.1: Schott's device

"A", a large magnet that elevated on a short pillar and connected to a straight inclined tube and "C" "F" the ends is connected with a curved or semi-circular tube.

It is believed that the weight at the lower level is supposed to ascend through the curved tube by the attraction of magnet "A" and upon reaching the equilibrium position at the highest point, then it will be drawn by the magnet through the curved tube to the point "C" and keep on going perpetually. However, the impracticability of this device is manifest because there is sufficient strong attraction between the weight and magnet at the highest point "C", thus the weight won't fall to the curved tube.

Another example is that the "magic wheel" appeared in 8th century Bavaria. It was a wheel which spinning on its axle powered by the lodestones. The wheel was supposed to spin perpetually. However, the wheel stopped inevitably due to the friction although it did rotates for a long time (Eberhart, 2007).

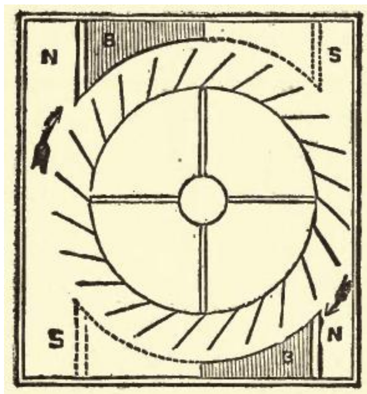

Figure 2.2: magnet driven wheel

Another perpetual motion device by magnetism appeared in the public journals of England in 1828.(The Herald of Christ's Kingdom. VOL. IX., 1926) A light constructed wheel that the rim is furnished with slips of steel. Two sets of magnet with different opposition are placed accordingly: S S, be placed with their south poles nearest the rim of wheel while N N, with their north poles in same position. Then, based on the attraction between opposite poles and repulsion between similar poles, the wheel will be driven round by the force acting conjointly on four points of its circumference.

Prior to early part of 19th century, an invention was invented in the aspect of magnetism device by unknown inventor, formally known as magnetic pendulum. This device was designed with a pendulum attached with the magnets and due to

attract and repel, the device is expected to create swinging perpetual motion. However, this device was not working because the magnets attraction would eventually attract the swinging mechanism and stop the device motion (Verance, 1916). Villard Peter of Maricourt has designed a magnetic globe. If it were mounted without friction parallel to the celestial axis, would rotate once a day. The globe was designed to serve as an automatic armillary sphere (Mirowski, 1991). Several experiment was conducted during this period to prove the perpetual motion, F.S Mackintosh, of England in 1823, has sought to accomplish perpetual motion and perform several experiments based on his invention. His work was then published in "Mechanics Magazine". However, his was convinced that the impossiblity of perpetual motion, refer to his alleged invention (Verance, 1916).

During the industrial revolutions period where the major changes on the agriculture, manufacturing, mining, transport and technology, more and more perpetual motion free energy is claimed to be invented. In 1900, Nikola Tesla claimed to have discovered a basic concept and theory to build the perpetual motion devices for second kind. He wrote that: "A departure from known method – possibility of a "self-acting" engine or machines, inanimate, yet capable, like a living things, of deriving energy from the medium – the ideal way of obtaining motive power (Vacca, 2004)."

After the industrial revolutions where the century of modern era was began. In 1977, Robert George Adams from New Zealand developed the Adams Motors which is an over-unity device. His design claims to have a lot of theories about the Aether – Energy that flows from environment. His machine was granted a UK patent, GB2282708, together with Dr. Harold Aspden (Adams & Aspden, 1995). In 1979, Howard Robert Johnson developed a permanent magnet motor that can run without an input of electricity or any other kind of external however only using the energy contained in the atoms of permanent magnets. The unique and innovative design of his motor has granted him to receive U.S Patent 4,151,431 (Johnson, Permanent Magnet Motor, 1979).

In 1991, Troy Reed from Oklahoma claimed the development of his small permanent magnet motor prototype. The device consists of permanent magnets placed on four disks where two outer disks are stationary. Two inner are mounted on a common rotating shaft. The motor is driven by the repelling forces of fixed and rotating magnets. Reed has been issued licenses for manufacturing the motor and received the investment money. However, after 1998, Troy Reed is failed to present his working unit of motor after the result of huge amount of investment (Allan, 2007).

After the 21st century where the rising concern over energy security due to the depletion of the fossil fuel, the development of the free energy source has become more interest in all available forms of alternative energy. Recently in 2006, Steorn Ltd, a company from Irish has claimed the development of over-unity device based on rotating magnets, and took out an advertisement soliciting scientists to test their claims. However, their design of the motor is still under research and diagnosis by the scientist until today and the feasible of the motor is not known yet (Steorn, 2000 - 2010). In 20th of April 2010, Muammer Yildiz has invented a permanent magnet motor claimed to have over-unity characteristics and his invention was patented and demonstrated in Technical University Delft, Netherland (Kelly, 2010).

2.2 Howard Johnson's Motor

Howard Johnson's Motor is known as the motor that uses the natural behaviour of permanent magnet which is repulsion and attraction to create the indefinitely rotating motion of the motor. According to (Hyydia 1980), Johnson's motor is directed to the method of utilizing the unpaired electron spins in ferromagnetic material as the power source without any electron flows in normal conductors. The magnetic flux created by the magnet are controlled and concentrated to orient the magnetic forces to do useful continuous work (Hyydia, 1980). According to this patent, Howard Johnson has been granted a U.S Patent No. 4,151,431 from highly sceptical patent office for successfully discovered, built and demonstrated a motor that can run without an input of electricity or any other kind of sources but using only the energy contained in the atoms of permanents magnets.

However, the feasibility of Howard's Motor is being suspected as it has violated the Conservation Law of Energy. Besides that, some scientists argue that no work is done as the repulsion of the magnet is not considered as a kind of energy. However, by not violating the conservative law of energy, it is possible that energy use to rotate the motor associated with spinning electron of the atoms.

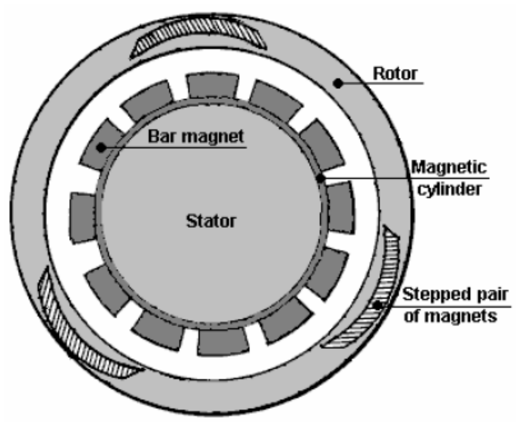

Figure 2.3: Basic Design of Johnson's Motor

2.3 Adam's Motor

The New Zealander, Robert Adams has produced a motor which appears to have 800% efficient, typically, known as over-unity machine and he has received a UK Patent, GB2282708 with Harold Aspden, entitled Electrical motor-generator. According to the (Adams & Aspden, 1995), Adam's Motor is an electro-dynamic motor-generator has a salient pole permanent magnet rotor interacting with salient stator poles to form a machine operating on the magnetic reluctance principle. The motor was designed and built using permanent magnets on the rotor and pulsed electromagnets on the frame of the motor. Robert Johnson found that if the configuration of the motor was adjusted correctly, the output from the motors that he built exceeded the input by a large margin which is 800%.

2.4 Charles Flynn's Motor

Charles Flynn's motor is another example of the patented invention that achieved over-unity term. This patent illustrated an invention which is a motor with permanent magnets positioned so that there is magnetic interaction between them. A coil placed in the space between the permanent magnets is used to control the magnetic interaction. The coil is connected to a source of electric potential and controlled switching so that closing the switch places a voltage across the coil and affects the magnetic interaction between the permanent magnets as to produce rotational movement of the output shaft (Flynn, 1995). According to the patent, the motor uses electromagnet shielding to achieve continuous rotation. The input is very small with even a 9-volt battery being able to operate the motor and produce an output power which is substantial and operation up to 20,000rpm. Figure 2.4 is the basic illustration of Charles Flynn's Motor.

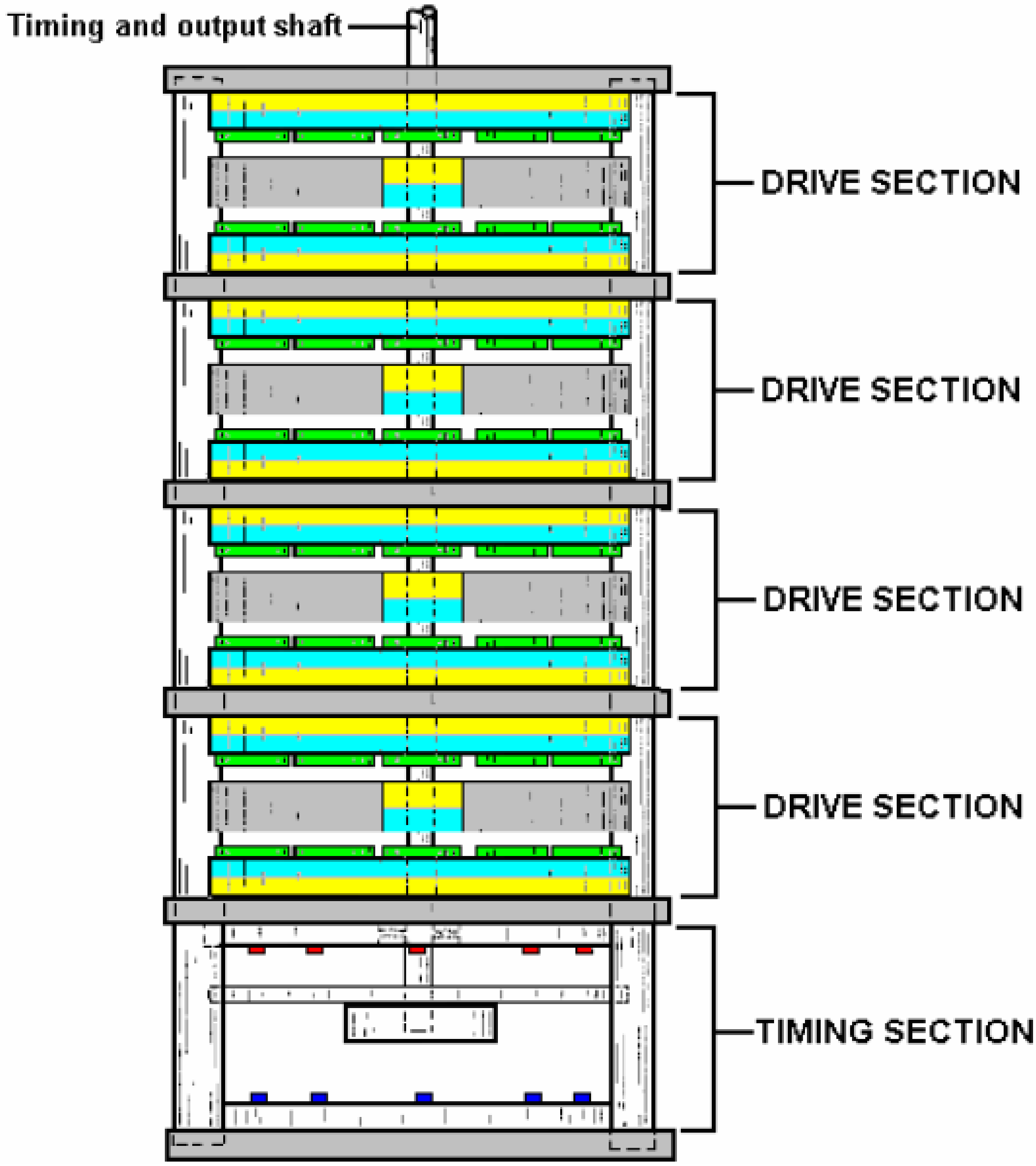

Figure 2.4: Basic Illustration of Charles Flynn's Motor

2.5 Steorn's Motor

Steorn, of Dublin Ireland, claims to have discovered a technology that produces "free energy" that could transform the renewable energy sector, providing clean, continuous, reliable, safe, affordable energy for the world. They have essentially two iterations of the effect: an all-magnet motor technology as well as an electromagnetic over-unity technology (Edel, RTC News, 2007)

(Steorn, 2000 - 2010) claimed that Orbo is a technology that creates energy from magnetic interactions which is a over-unity technology as it provides more energy out than is put in. The Irish company Steorn have produced a system which is almost identical to the Charles Flynn Magnet Motor which described in section 2.4. They name their device as "Orbo" and its operation is quite similar to Charles Flynn's motor (Kelly, 2010).

Steorn illustrated their design as shown as below figure:

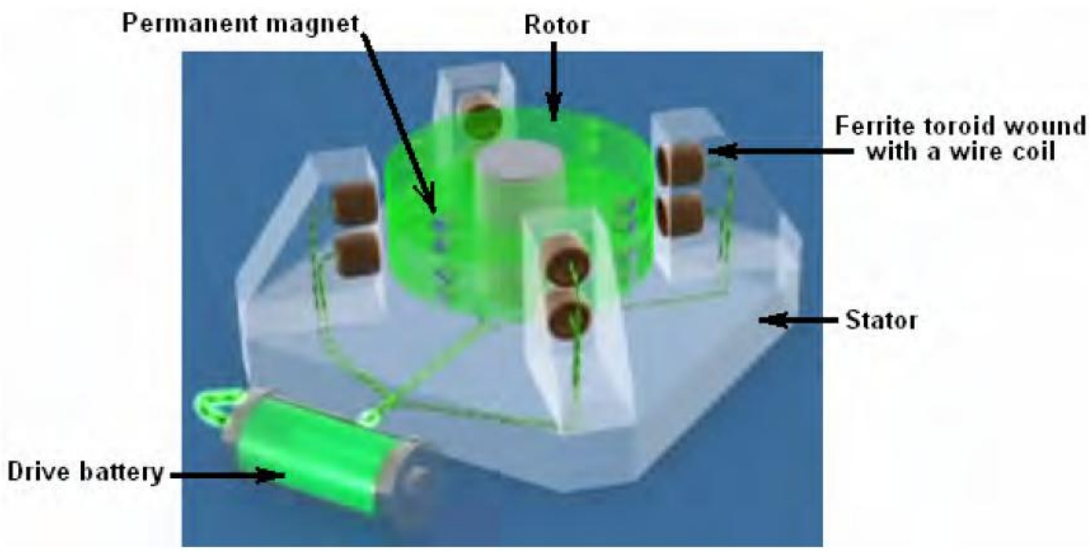

Figure 2.5: Steorn Motor Illustration

Based on the above design, we can see that eight ferrite rings are mounted on the stator in four locations 90° apart. These mechanisms are wound with copper wire coils which can be powered by a battery, via a timing mechanism. The rotor has embedded in it, eight pairs of small permanent magnets, also spaced 90° apart.

2.6 Muammer Yildiz's Magnet Motor

Muammer Yildiz has invented a powerful permanent magnet motor and his invention was patented with a title "Device Having an Arrangement of Magnets". This invention is a device for generating an alternating magnetic field that interacts with a stationary magnetic field (Yildiz, 2010). According to (Kelly, 2010), Yildiz demonstrated his motor to the staff and students of a Dutch University. During the

demonstration, the mechanical power output was estimated at 250 watts. After the demonstration, the motor was disambled completely to show that there were no hidden power sources. The special layout of the dipole magnets of the inner stator, the rotor and the outer stator during the rotation of the rotor, would generates an alternating magnetic field that interacts with a stationary magnetic field which allows a largely loss-free movement of the rotor as it spins between the inner and outer stator (Yildiz, 2010). Figure 2.6 illustrated basic structure of Yildiz's Motor.

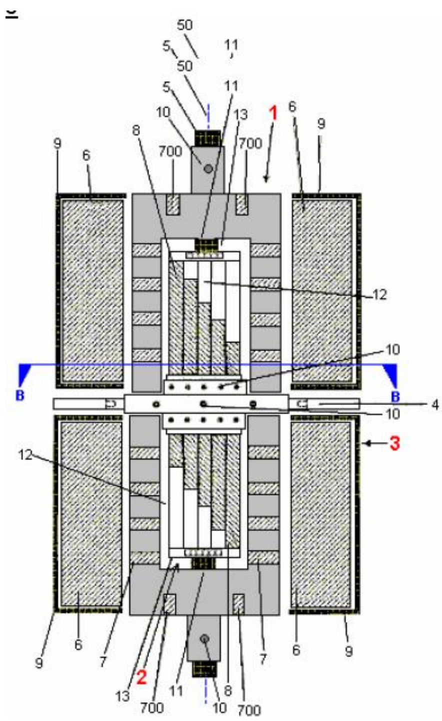

Figure 2.6: Basic structure of Yildiz's motor

2.7 Rotating magnetic device

Gaurav Tewari and John McBean from MIT undergraduate had won in their program's annual Perpetual Motion contest in year 1999. They had designed a device which consist a magnetically levitated, flat rectangular bar rotating in a vacuum-sealed glass container. (MIT Tech Talk, 1999).

A post on the bottom of the glass chamber protrudes through a hole in the center of the bar and keeps it positioned correctly. The bar will stay suspended and rotating in a horizontal plane because of the interacting forces of two magnets at its ends and four magnets attached to the walls of the chamber, all with the same pole

facing inside. Also, a magnet at the base of the glass chamber repels the magnetic underside of the rotating bar and helps it levitate.

This device is so-called as free energy because they believe the way of locating an object in motion in a nearly friction-free environment must result in zero dissipation of energy.

CHAPTER 3

METHODOLOGY

3.1 Proposal for the Process of Investigation

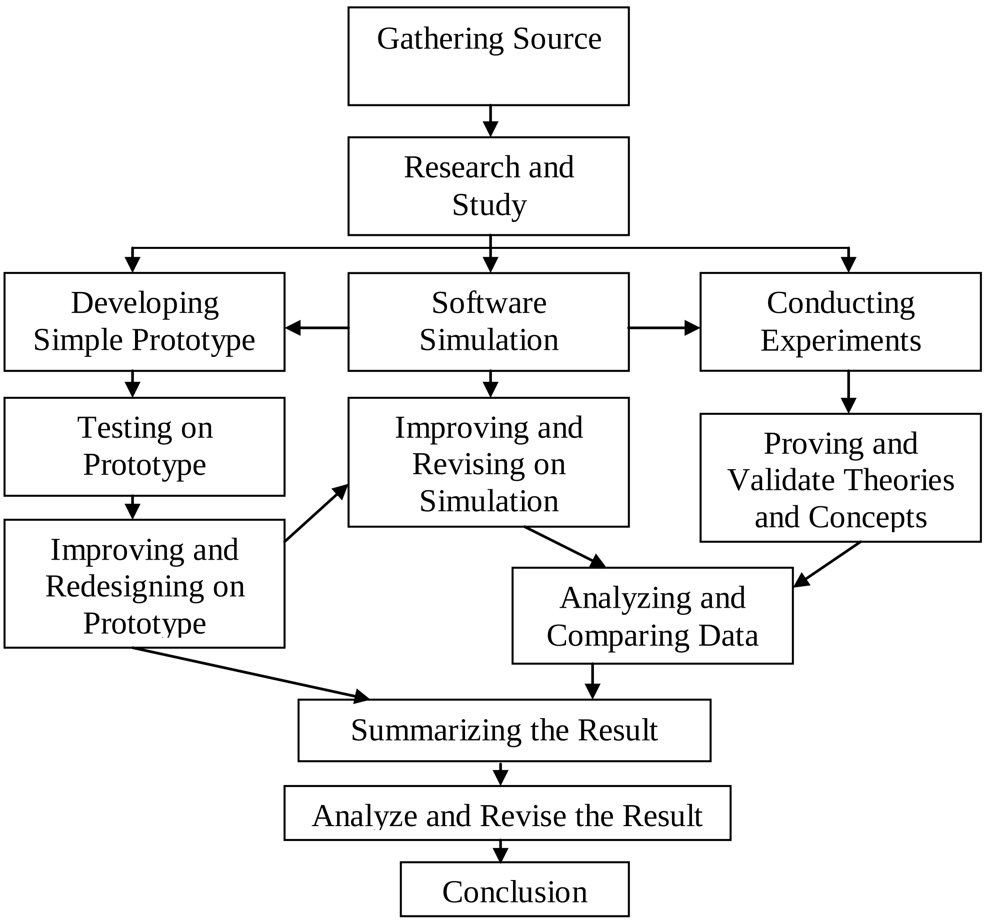

Figure 3.1: Phase Planning for Investigation on Free Energy Magnet Motor

Figure 3.1 as shown above is the process of planning for this project regarding investigation on free energy magnet motor. Firstly, wide variety of information has to be collected and filtered for further study and research. The gathered sources are more related to the free energy magnet motors that was patented or publicized to be working. Besides that, some information and theories that proving the principles of free energy were studied and reviewed for further analyze. After went through the research and study stage, software simulation on the magnet motor or some experiments that proving some free energy term are to be performed. After went through the research and study stage, some experiments will be carried out for study for justifying basic principle and theory of free energy behind the properties of permanent magnets. Actual experiments can be performed to proved some theories and principles of free energy. Thus, the experiments data can be compared with the simulation data. On the other hand, simple prototypes can be developed based on some study and theory of free energy. Further improvement or adjustment can be applied to the prototype for further testing and analyzing. Software Simulation can be conducted first before the prototype is actually being developed and improvement can be done based on simulation result. Eventually, all the results that were done during the investigation were summarized and further to be analyzed and studied. Lastly, a conclusion will be presented to conclude the feasibility of the free energy magnet motor.

A Gant Chart for the process of the project was developed based on the proposal above and attached as Appendix A.

3.1.1 Research and Study on HJ Motor

The Howard Johnson's Motor has been chosen to be study thoroughly throughout this investigation project. This motor utilized the properties of permanent magnets which is arrangement and shapes of magnets to create a continuous rotation motion which can be harnessed to do useful work. This characteristics of motor is more accorded with the project title which is investigation on magnets self repulsive perpetual motion device where the attraction and repulsion of magnets is the main power source of driving the motor. Secondly, the invention of this motor was patented by the highly sceptical US patented office as the permanent magnet motor.

Therefore, valuable information can be studied and extracted from the Howard Johnson's invention as a path way to investigate the feasibility of free energy magnet motor. Therefore, several research and software simulation were conducted on studying the Howard Johnson's Motor throughout the investigation

3.1.2 Software Simulation

Software Simulation method is based on the process on imitating a real phenomenon by using a series of simulation software with computer. The simulation program allows the user to observe and analyze any relevant data through simulation without actually performing the operation. On the other hand, the software simulation can be used to analyze the phenomenon or situation that is hardly to be achieved in practical situation. While performing the investigation, the simulation software such as Finite Element Method Magnetics 4.2 (FEMM 4.2) and Solidworks 2011 were used to model and simulate the arrangement of magnets that were possible to create free energy. Besides that, the experiments that related to the term of perpetual motion or free energy has been simulated and the simulated data and information were compared with the actual experiments result that had been conducted in the laboratory.

A series of software simulations that have been performed throughout the investigation were the simulations on Howard Johnson's Motor, Various Shape of Magnets, Magnetic Push-Pull Experiment, Magnetic Propulsion Experiment, Magnets in Linear Arrangement and Circular Arrangement, Halbach Array in Linear and Circular Arrangement. The above simulations would be further studied and compared with the actual example as a purpose of investigation.

3.1.1 Experiment

Several experiments related to the properties of magnetism that proved the existence of the free energy had been simulated while the simulation data were analyzed and compared with the actual experiment. The experiments that planned to be performed

were the magnetic push-pull experiment and magnetic propulsion experiment where the experiments were trying to prove the existence of special properties of magnets might be able to lead to perpetual motion.

3.1.2 Developing Prototypes

There is a well-establish tradition of prototyping in engineering as means of testing a product in order to determine if a product can be built to ascertain if there are any operating anomalies in the design. Prototyping the system provides "proof of concept" (O'Leary, 1988). The development of the prototype could help in ensuring the theories and concept of an application in order to ensure the success of the project.

Throughout our investigation, 3 simple prototypes of free energy magnet motor were built for the purpose of investigating and studying. The prototypes that planned to be developed were the magnet motor with the design of 13 magnets on its stator, 19 magnets on its rotor. Another design was the magnet motor with 8 magnets on its stator and 9 magnets on its rotor. Furthermore, a prototype with Halbach Array arrangement would be developed to study their properties.

3.2 Preliminary Study

3.2.1 Howard Johnson's Motor

Howard Johnson's Motor utilized the properties of permanent magnet which is repulsion and attraction to create the indefinitely rotating motion of the motor. The invention of the Howard Johnson's motor is directed to the method of utilizing the unpaired electron spins in ferromagnetic as a source of magnetic field for producing power without any electron flow as occurs in normal conductors, and to permanent magnet motors for utilizing this method to produce motive power source solely through the superconducting characteristics of a permanent magnet. The magnetic flux created by the magnet are controlled and concentrated to orient the magnetic forces to do useful continuous work (Hyydia, 1980). Besides that, Johnson was

trying to prove that his invention does not violating the energy conservation law. The energy that used to power his motor may have come from the electrons of ferromagnetic material which storing a great mass of energy. The energy inside the permanent magnet is possible to be harnessed by using an appropriate ways which is not known by conventional science today, whereby Johnson's may have discovered the method of harnessing this energy. However, the theories of harnessing this energy are still under study and research.

3.2.1.1 Basic Operation and Design

The timing and orientation of magnetic force at the rotor and stator components produced by permanent magnets to produce a motor is accomplished with the proper geometrical relationship of these components (Johnson, Permanent Magnet Motor, 1979). In the same manner, the continuous rotational motion of the motor is caused by the magnetic flux of the motor that is always unbalanced.

The magnet arrangement is shown as below figure 3.2,

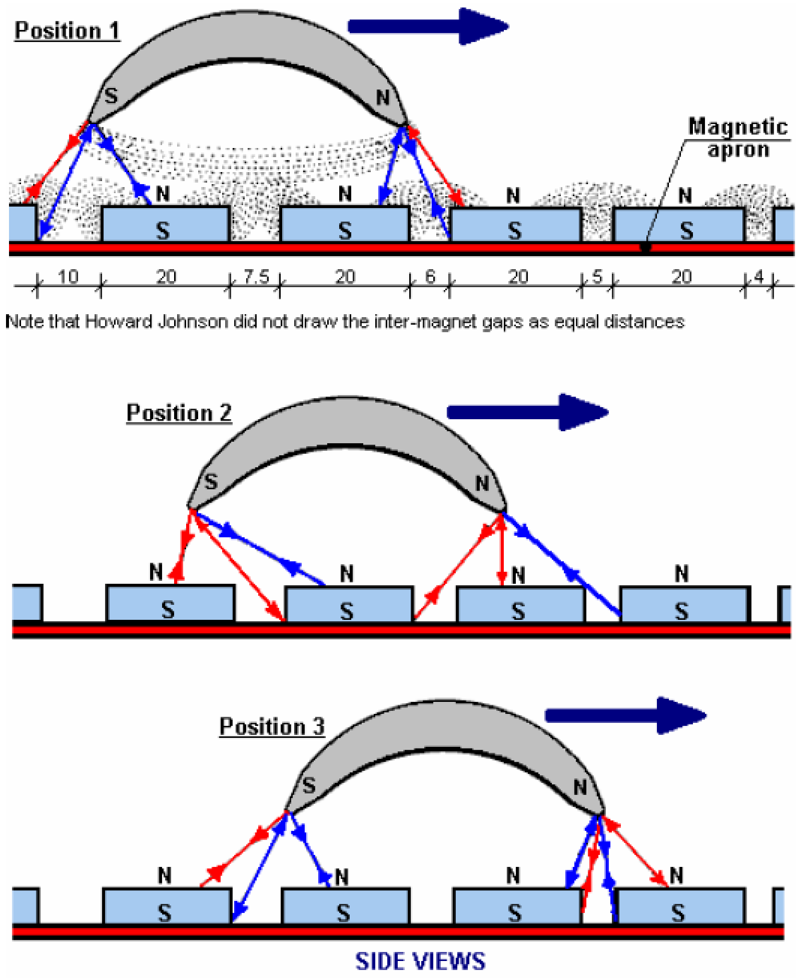

Figure 3.2: Complex magnetic forces interacting to create magnetic off balance effect.

The above configuration shows the dramatically different magnetic effects at the north and south poles of armature magnets. The above figure is showing complex magnetic forces interaction which can create off balance effects that move the armature from right to left. Red lines show magnetic attraction, blue lines shows repulsion effect. Besides that, the gaps between the magnets are not constant width.

3.2.1.2 Magnetic Imbalance Force

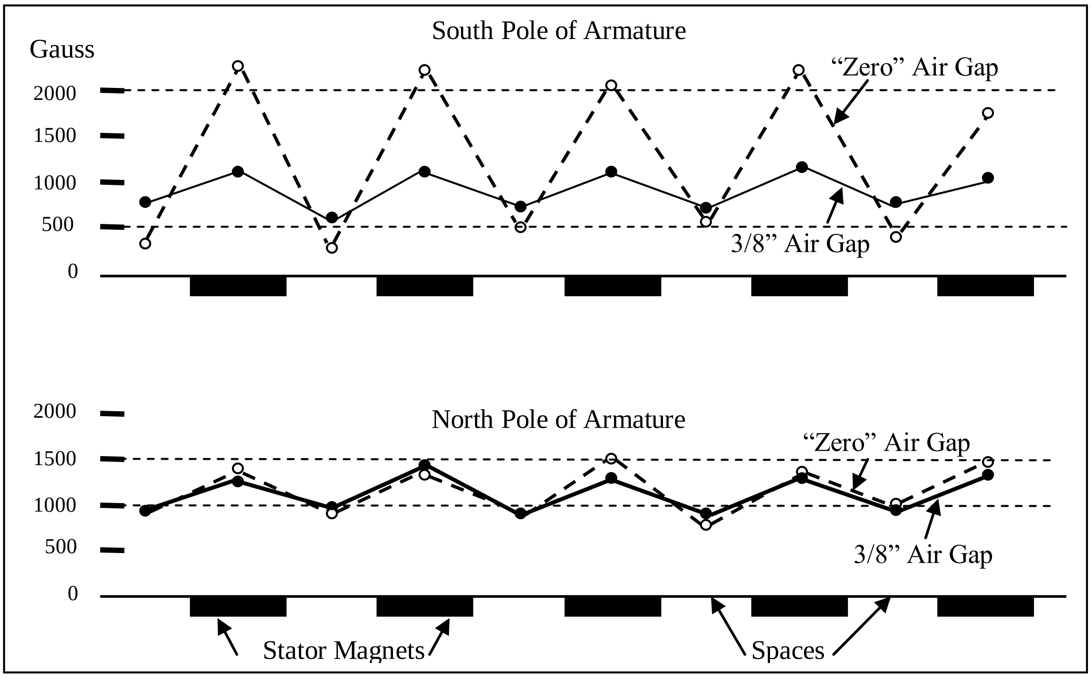

Figure 3.3: Magnetic Imbalance Forces Graph

According to the above graph retrieved from (Hyypia, 1980), which is the experiment performed by Johnson to prove the theory of magnetic imbalance forces, the magnetic flux from the North Poles and South Poles of the armature were measured and plotted on the graph while 2 different configurations were taken to be tested which are 'Zero Air Gap" and 3/8" Air Gap. This experiment was carried out by placing the probe of the Gauss Meter and measured the magnetic flux at the corresponding situation. The result was then recorded in a table as shown as Appendix A, and plotted as figure 3.3. It appears that graph result of magnetic flux is seemed like not so symmetry. So, with this, a hypothesis can be made that this phenomenon is showing the constant off balance forces.

By referring to the Appendix B, readings taken at the North and South Pole of the armature magnet indicate there is constant off balance situation. The total magnetic flux that was measured for the "Zero Gap" at North Pole is 30,700 Gauss (Magnetic Strength Unit). The total magnetic flux that was measured 3/8" air gap at North Pole is 28,700 Gauss. The difference between these measurements is 2,000

Gauss. On the other hand, the total magnetic flux that was measured for the "Zero Gap" at South Pole is 33,725 Gauss. However, the 3/8" Air Gap was measured to be 24,700 Gauss. For this situation, the difference is a much larger 9,025 Gauss. Clearly, the magnetic force conditions are far from identical at the two ends of the armature magnet. The force conditions are far from identical. The imbalance of the rotor is mainly caused the arrangement of the magnet where the gap width between the magnets is not same. According to the experiment that conducted by (Aspden, 1994), the Air Gap Reaction, the air gap between the magnets does contribute some prominence effect to the energy balance of the magnetic energy.

3.2.1.3 Shapes of the Magnets

According to Johnson's (Hyypia, 1980), Johnson claimed that the curved magnets with sharp leading and trailing edges are important because they focus and concentrate the magnetic energy much more effectively than the blunt-end magnets. The magnets with shape of arc known as arcuate are made slightly longer than the lengths of two stator magnets plus the intervening shapes. Therefore, the shape of magnets which is in U-shape with sharp edge somehow will give extraordinary effect to power up the motor. Further study and research on the shapes of magnets are necessary while performing our investigation.

3.2.2 Halbach Array

Halbach array is a special type of permanent magnets that concentrate the magnetic distribution of magnetic field on one side while cancelling the magnetic field to near zero on the other side. This permanent magnet arrays were invented by Klaus Halbach using advanced analytical approach where the motivation was to find more efficient means for the utilization of permanent magnets for use in particle acceleration and in control of particle beam. (Merritt, Post, Dreifuerst, & Bender, 1994).

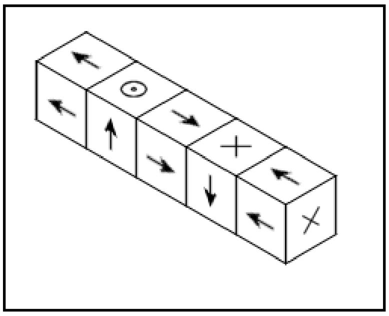

Figure 3.4: Linear Halbach Array – Permanent Magnets Orientation

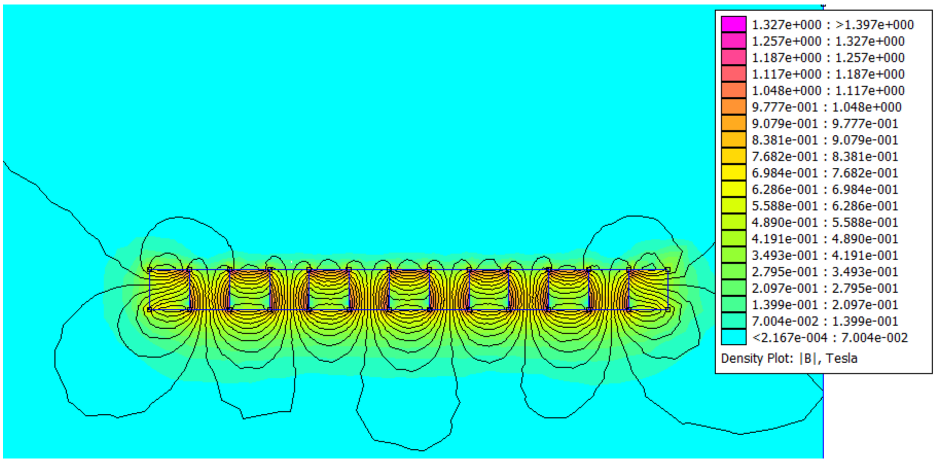

Figure 3.5: Magnetic Field Distribution of Halbach Array

Figure 3.4 above showing the orientation of each piece of permanent magnets in Halbach Array. This array would give a strong field underneath, while the field above would eventually cancel near to zero. The magnetic field distribution of Halbach Array is as shown as above figure 3.5. The figure showing that density of magnetic field underneath is greater than the field above the array.

The Halbach Array can be implemented in the design of high power and efficiency of generator or motor which can reveal some rather remarkable properties. The arrays whereby weight-efficient inherently and capable to provide higher magnetic flux compare with monolothic magnet of the same size. Therefore, this principle can be utilized to increase the efficiency of motor or generator.

Since some of the hypothesis had been clarified that the monopole of magnet can be utilized to extract the magnetic energy which can create perpetual motion and the properties Halbach array is now known as the most likeliness monopole of

magnet in conventional science field. Therefore, the research and simulation of Halbach array had been carried out in our investigation for free energy magnet motor.

3.3 Experiments

3.3.1 Magnetic Push-Pull Experiment

A simple experiment was performed to study the natural polarity of the poles of the magnet that can be used to harness the magnetic energy from magnets for producing Free Energy. This experiment can be performed by using 2 ferrite magnets.

Apparatus:

- Two Ferrite Magnets
- A “double face” adhesive tape
- A “non-magnetic” balance
- A small piece of wood

The layout of the experiment is illustrated as figure 3.6 below:

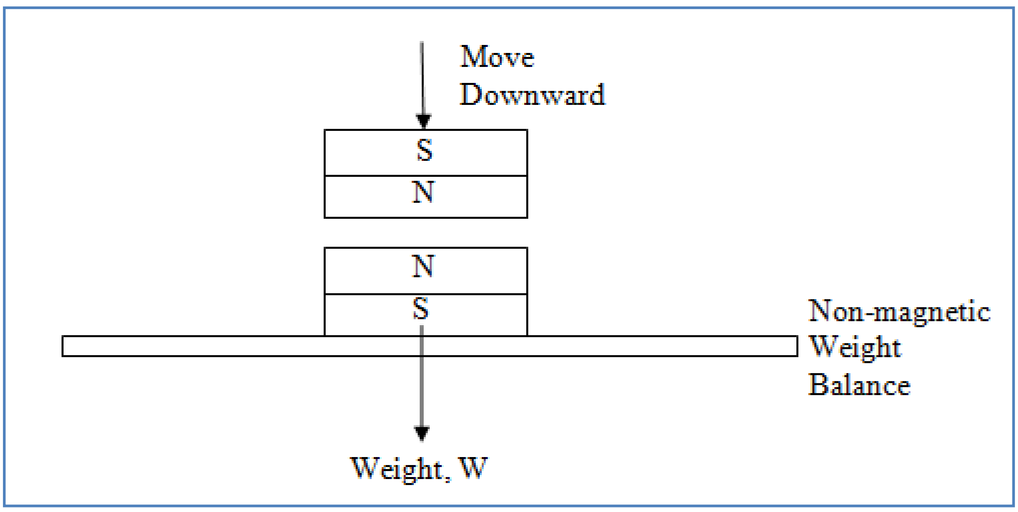

Figure 3.6: Axial Force Measurement

Firstly, the idea of this experiment is to fix one of the magnets at the center of the weight balance with double face adhesive tape with its North Pole upward. Measures and records the weight of the magnet. After that, take the other magnets with hand and points the North Pole downward and then approach the magnets on the weight balance to create a strong push downward due to repulsion, and stop when the gap is about 1mm. Measures and records down the weight display on the weight balance.

Second step of this experiment is to measure the tangential force that translating a magnet coming for the left to the right during its tangential approach above the fixed magnet. The layout for this part is illustrated as figure 3.7.

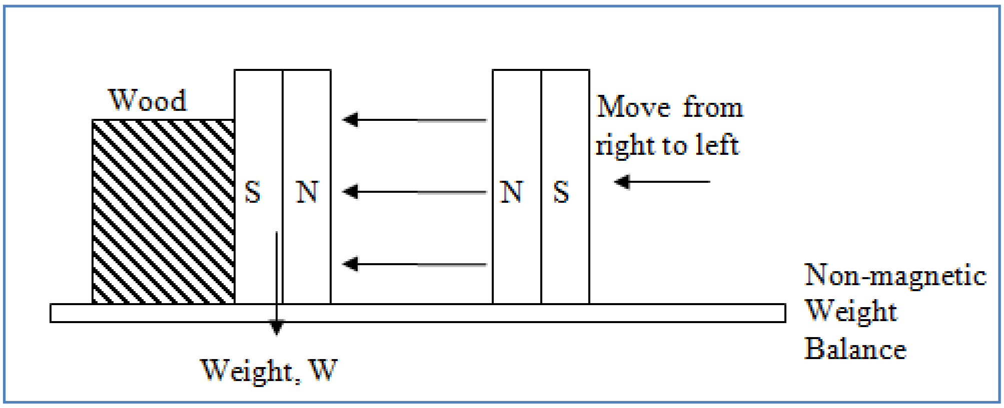

Figure 3.7: Tangential Force Measurement

The free moving magnet supposes to approach the fixed magnet in repulsive configuration as shown as above figure 3.7. Afterward, the tangential force is measured and recorded from the non-magnetic weight balance. After performing the above 2 configurations of the experiment, the axial and tangential forces are to be compared and analyzed.

The experiment was performed as shown as figures 3.8 to 3.10 below. The experiment result was recorded in a table and plotted in graph. The result of this experiment was compared with the simulation result of this experiment and has further been discussed in chapter 4.

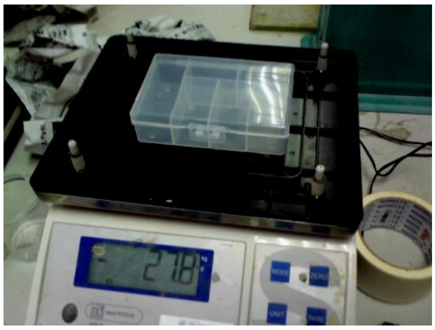

Figure 3.8: Electronic Weight Balance

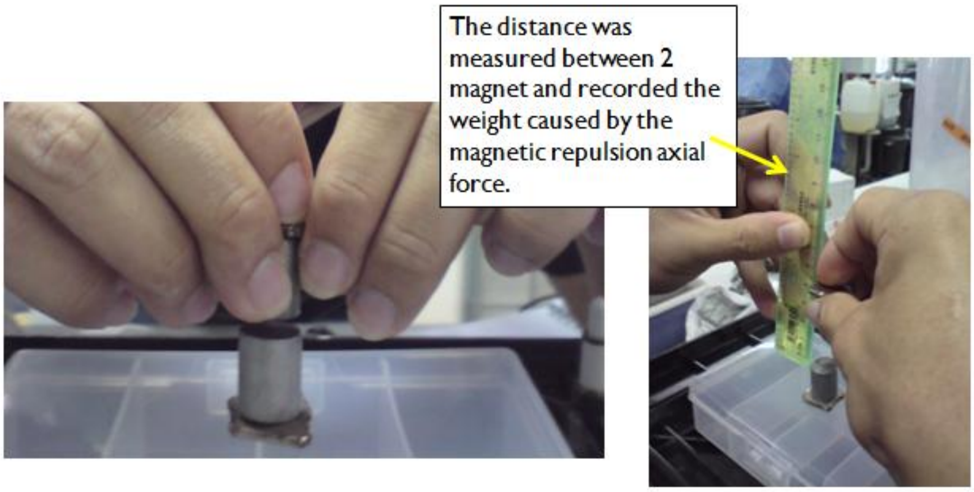

Figure 3.9: Axial Force Measurement

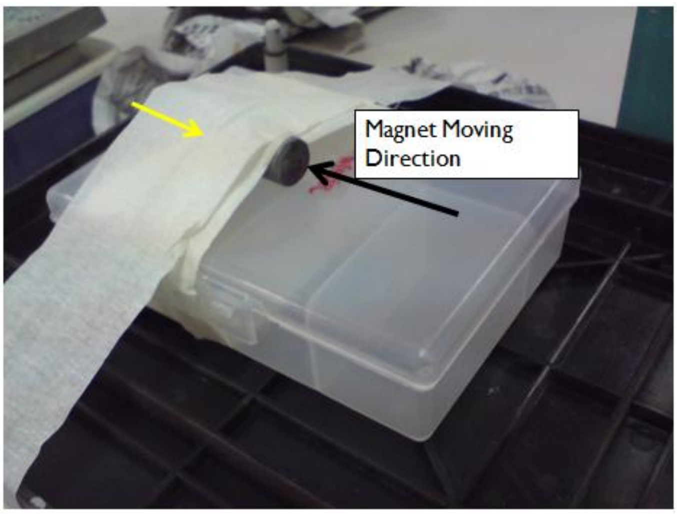

Figure 3.10: Tangential Force Measurement

3.3.2 Magnetic Pump Experiment

Another simple experiment with magnets is to shows the capabilities of energy tapping from permanent magnets by diverting magnetic flux. The magnets would attract the soft magnetic material. The experiment was conducted to test the maximum distance between the magnets and iron steel block before attraction happened. The configuration of the experiment is as shown as figure 3.11, 3.12 and 3.12 below:

Apparatus:

- 2 groups of Neodymium Magnets – Grade NdFeB 40
- Soft Magnetic Material – Steel Iron Block

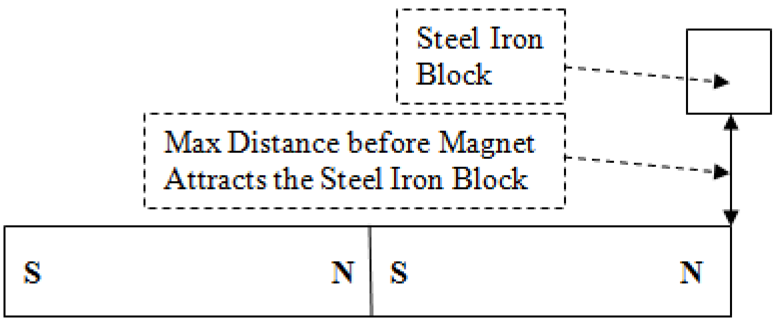

Figure 3.11: Magnets Poles Align in same direction – Measured at End Pole

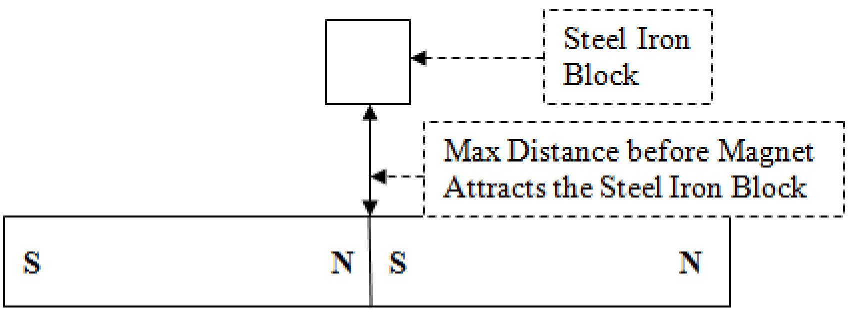

Figure 3.12: Magnets Poles Align in same direction – Measured at Middle

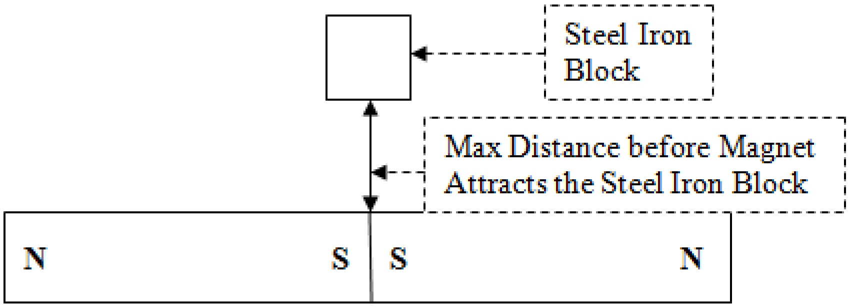

Figure 3.13: Magnets Poles Align against each other – Measured at Middle

The experiment was sub-divided into 3 tests as stated as above. Below figures are showing the configuration of test 1, 2 and 3.

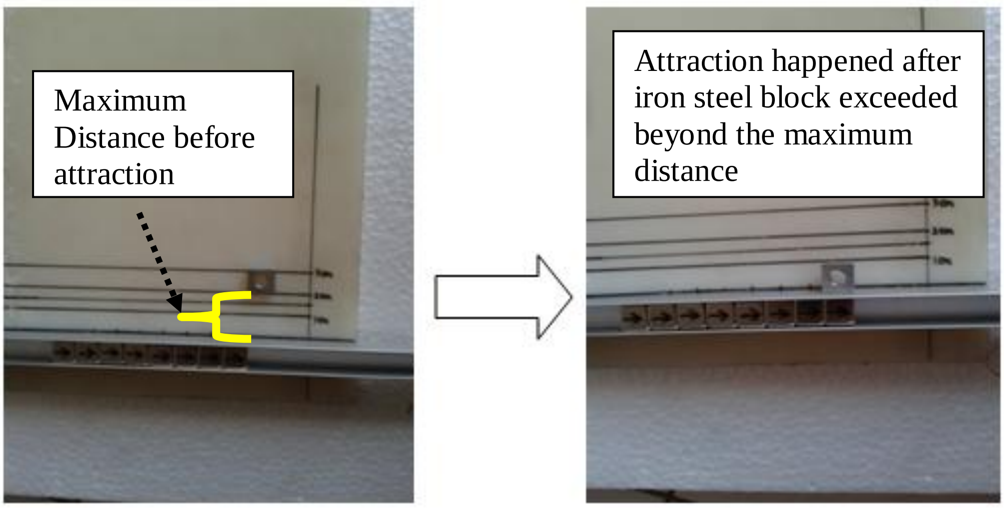

Figure 3.14: Test 1 of Magnetic Propulsion Experiment

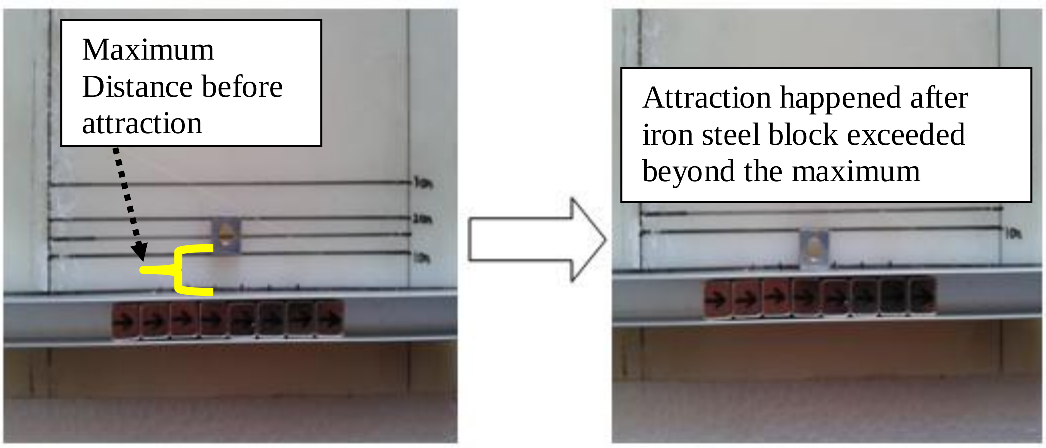

Figure 3.15: Test 2 of Magnetic Propulsion Experiment

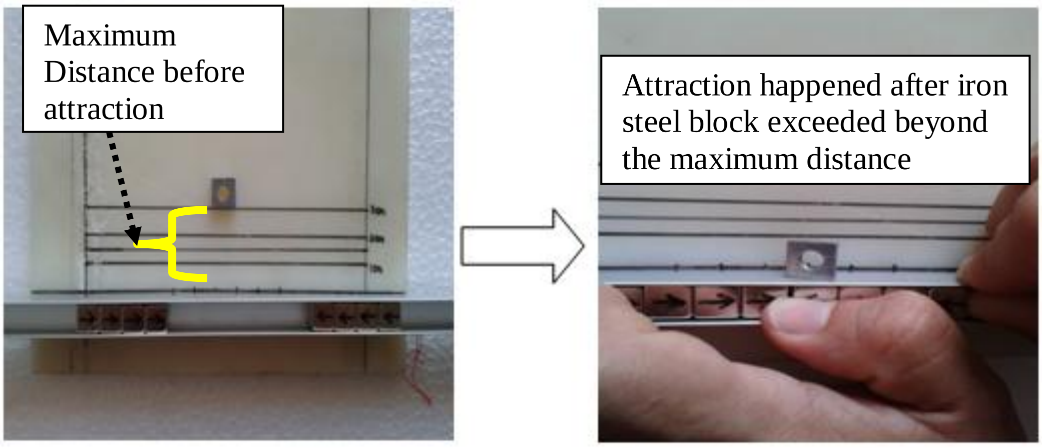

Figure 3.16: Test 3 of Magnetic Propulsion Experiment

A simulation was conducted for this experiment. The experiment results were recorded and compare with the simulation result in chapter 4.

3.4 Concept of Simulation

The software simulation of the investigation project was mostly performed by using FEMM 4.2 software. FEMM is known as a suite of program which can be used for solving low frequency magnetic or electromagnetic problems on two-dimensional planar and axisymmetric domains. This software can be used to solve linear/non-linaer magnetostatic, linear/non-linear time harmonic magnetic, linear electrostatic and steady-state heat flow problems. The Lua scripting languages is integrated into the interactive shell of the problem which can both build and analyze geometry and evaluate the post-processing. The Lua scripting function allows the equations and mathematical expression to be entered into the simulation of the model and rebuild the geometry of the model whereby allowing the model to be simulated and analyzed in different geometry , such as data acquisition for the rotor in complete rotational motion.

3.4.1 Solidwork 2011 - 2D Modeling

Before the simulation of FEMM 4.2 was performed, a 2D planar layout design of model has to be created in the first instance. The 2D layout model was imported to the FEMM 4.2 for further process and simulation. Throughout the simulation, the 2D

model layout was designed and produced by using Solidworks 2010. Figure 3.17 as shown below is the sample of 2D layout model which is a rectangular shape of magnet placing in a medium of air.

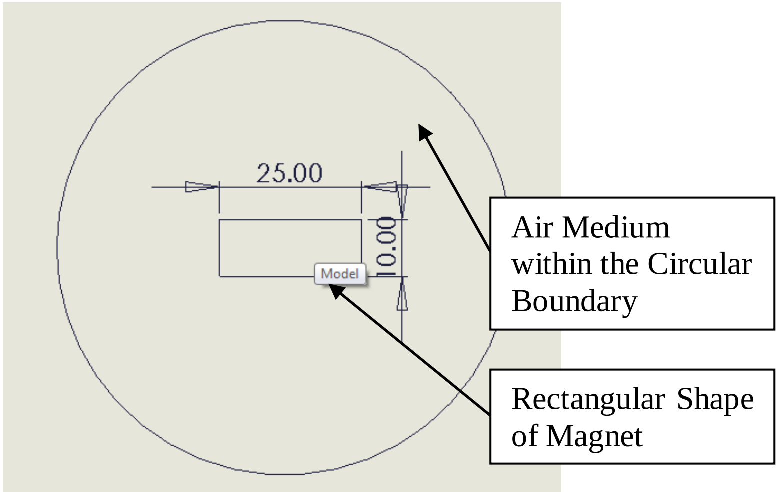

Figure 3.17: 2D Layout Sample Drawing

FEMM 4.2 supported the import and export of the DXF file format for the interfacing of CAD software or other finite element software. The DXF feature is a useful feature in FEMM 4.2 as it allows the user to draw an initial geometry using suitable CAD software. Once the geometry is laid out, it can be imported into FEMM and detailed for material properties and boundary condition. Figure 3.18 is showing the layout of FEMM 4.2 software while importing DXF file. A dialog will appear after the file is selected asking for a tolerance. This tolerance is the maximum distance between two points at which the program considers two points to be the same.

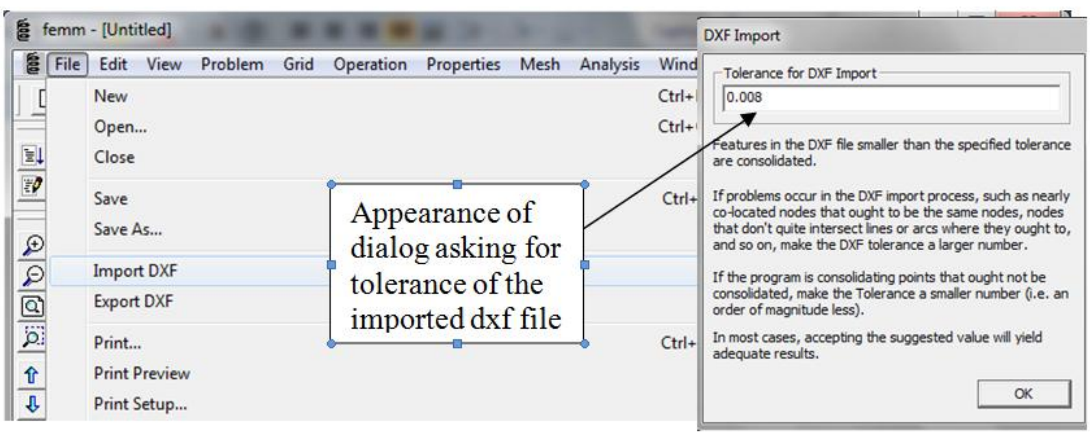

Figure 3.18: Layout of FEMM while importing dxf file

The imported 2D layout design geometry is as shown as below figure 3.19. Other than import the geometry from the CAD package software, FEMM 4.2 has feature which known as pre-processor which can be used for drawing the problems geometry, defining materials and defining boundary conditions.

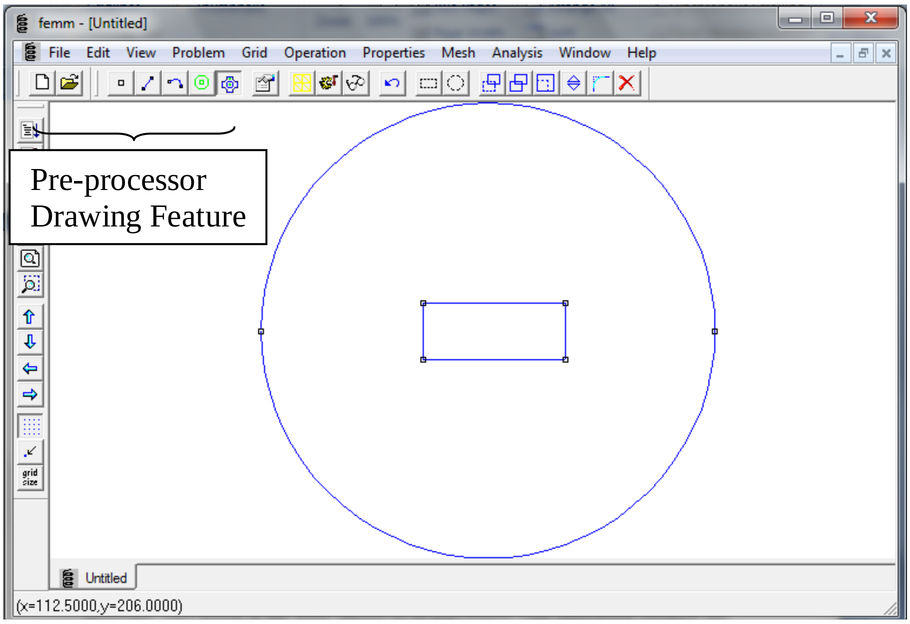

Figure 3.19: Imported 2D Layout Geometry in FEMM 4.2

3.4.2 FEMM 4.2 - Magnetic Pre-processor

The Magnetic Pre-processor is a feature that used for defining the initial condition of the geometry before simulating and analyzing the imported or drawn 2D model. Basically, this feature is capable of handling the drawing of geometry model, defining the material and boundary conditions for the selected geometry and etc. The process before proceed into post-processing which is the analytical of simulation phase is known as pre-processing.

After imported the geometry model from solidworks, the material properties are needed to be specified to the boundary of the model. Firstly, the material types are to be imported from the library of FEMM. Figure 3.20 as shown below is the method of determining the material use for the geometry of the model.

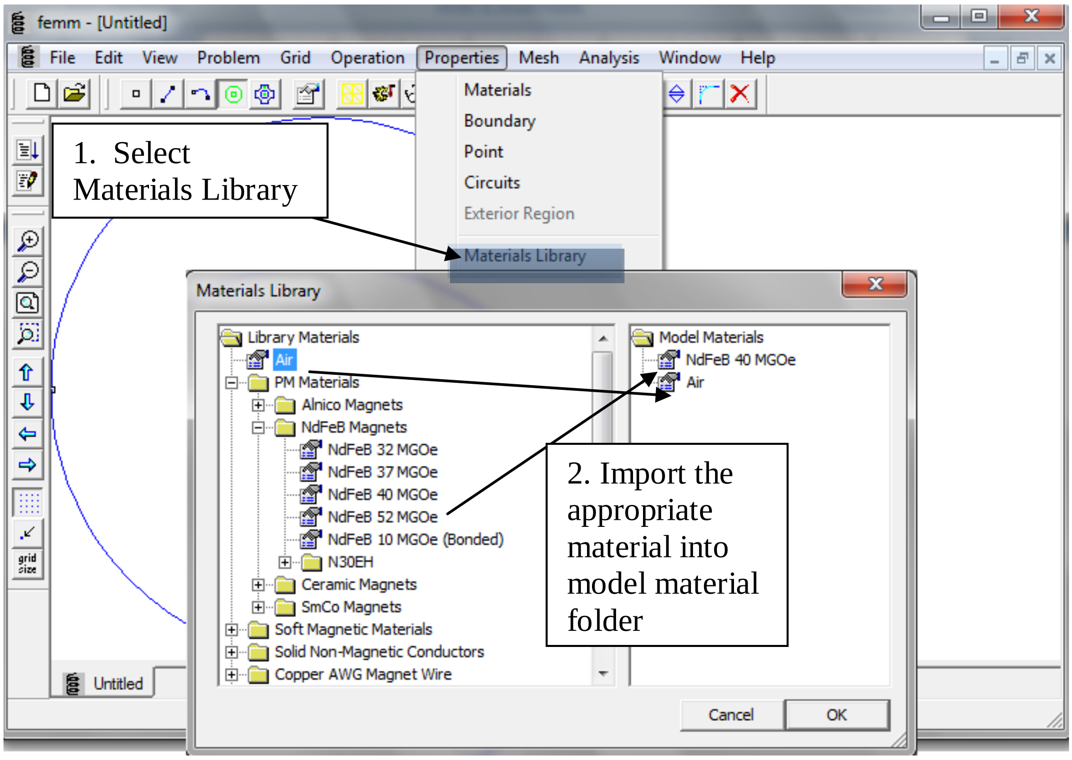

Figure 3.20: The Steps of Determining Material for Geometry Model

After importing the materials from the library, the next step is to define the material type for the boundary of the geometry model. Figure 3.21 is showing the steps on defining the material type.

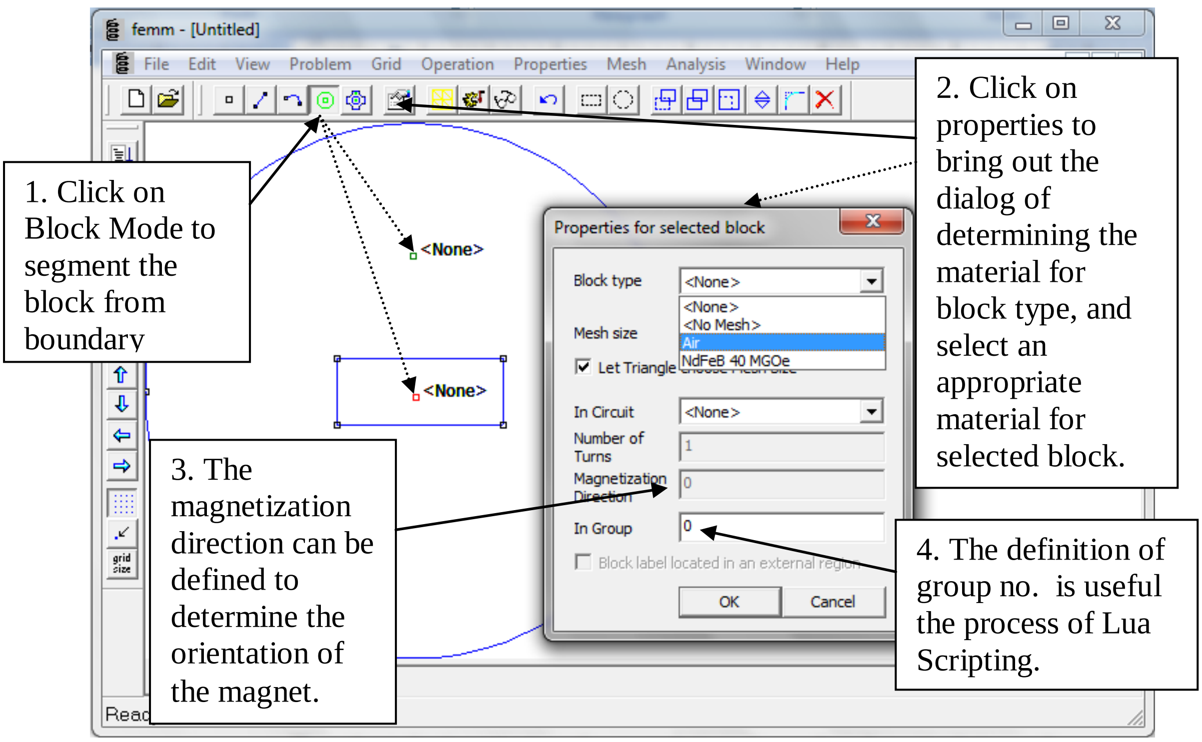

Figure 3.21: The Steps of Defining Material Type

After the materials have been defined for the block, the initial condition of the problem has to be defined before proceeding to the next step. The definition of problem type is specified by choosing the Problem Selection off of the main menu, a Problem Definition Dialog is shown as below as figure 3.22.

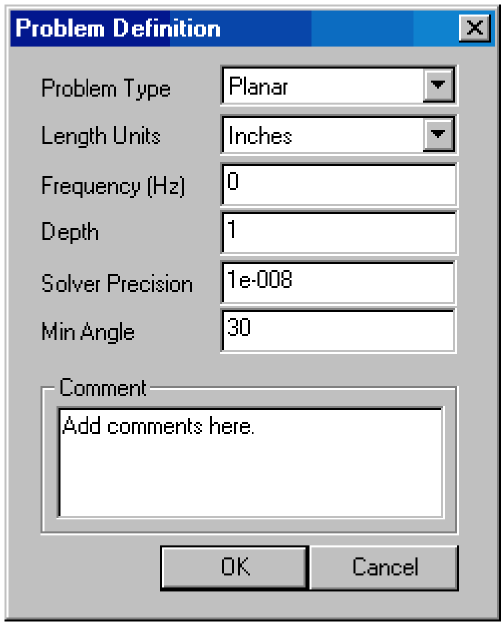

Figure 3.22: Problem Definition Dialog

Last step of the pre-processing is to meshing the model, analyzing the model and view the result. Below figure 3.23 is showing the toolbar button for starting analysis tasks.

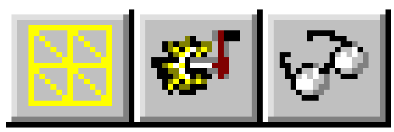

Figure 3.23: Toolbar buttons for starting analysis tasks

The first of these buttons is to run the mesh generator whereby the geometry model is triangulated for the finite element mesh is loaded into memory and displayed underneath the defined nodes, segments and block labels as a set of yellow lines. The mesh size can be defined for the problem where smaller the mesh size would provide in more accurate result however more time and memory consuming while solving the problem. The sample of meshing is as shown as below figure 3.24.

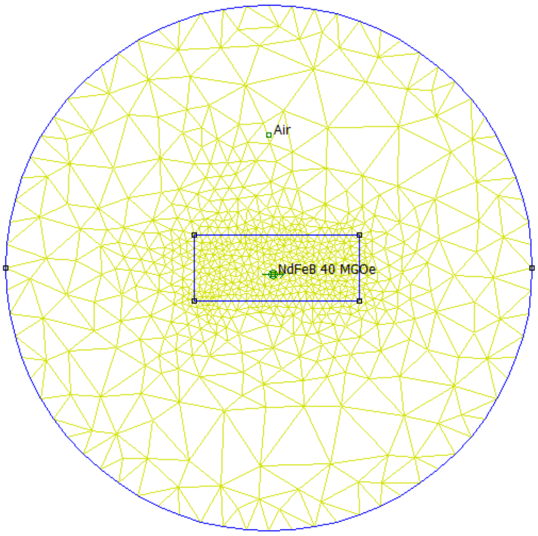

Figure 3.24: Sample of Meshing

The second button with the “hand-crank” icon, executes the solver which is fkern.exe to analyze the problem. When fkern runs, it opens up a console window to display status information while analyzing the problem. The time that fkern to solve the problem is highly dependent on the size and complexity of the problem. After the problem is solved, the “magnifying glass” icon is used to display the results in post-processing window. A detailed description of magnetic postprocessor is described in next section 3.3.4. Figure 3.25 below showing the sample of result in post-processing window.

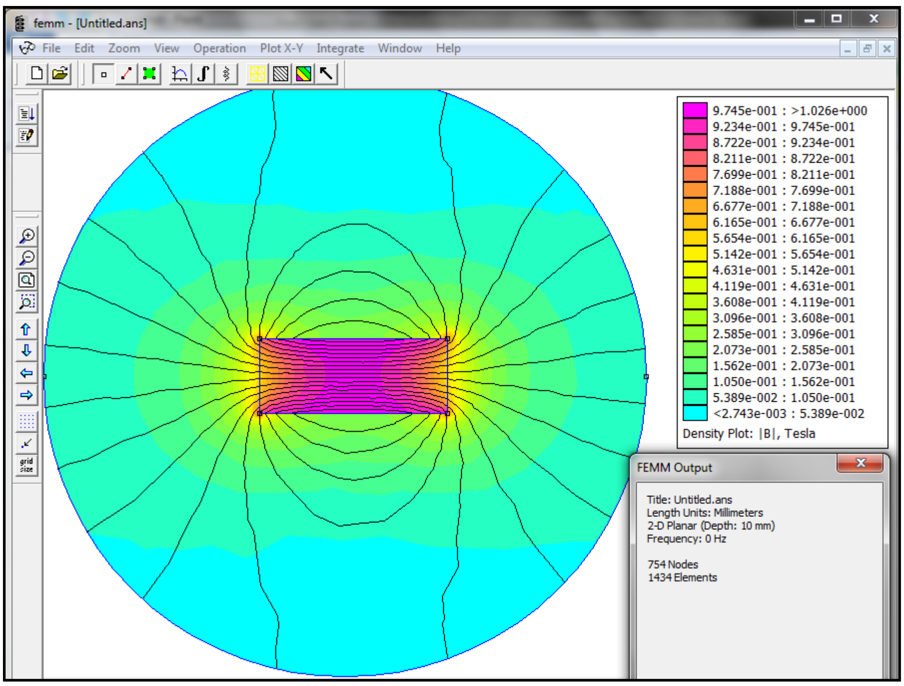

Figure 3.25: Sample of Post-Processing Result

3.4.3 FEMM 4.2 Simulation - Magnetic Post-Processor

The functionality of magnetic post-processor feature from FEMM is used to view the solutions generated by the fkern solver. A magnetic post-processor window is opened to view a generated solution for the problem. Basically, a visualization of magnetic field would be displayed in the post-processor window as shown as figure 3.25. The basic operation of FEMM post-processor is usually in 3 modes which are Point Value mode, Contour Mode and Block Mode. Figure 3.26 as shown below is the Analysis Mode Toolbar Button. These buttons denote Point Values Mode, Contour Mode, and Block Mode respectively.

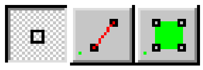

Figure 3.26: Analysis Mode Toolbar Function

Each modes of the above function are capable to acquire various type of solutions depend on the geometry of the model. Point Values Mode allows the user to click on various points in the solution region and display the local field values in the FEMM Output Window. The Contour Mode allows the user to define arbitrary contours in the solution region which allows plots of field quantities that can be produced along the contour and evaluation of various line integrals along the contour. Block Mode allows the user to define a sub-domain in the solution region, therefore a variety of area and volume integrals can be taken over the defined sub-domain. Figure 3.27, 3.28 and 3.29 below showing the example of extracting data from various types of analysis modes.

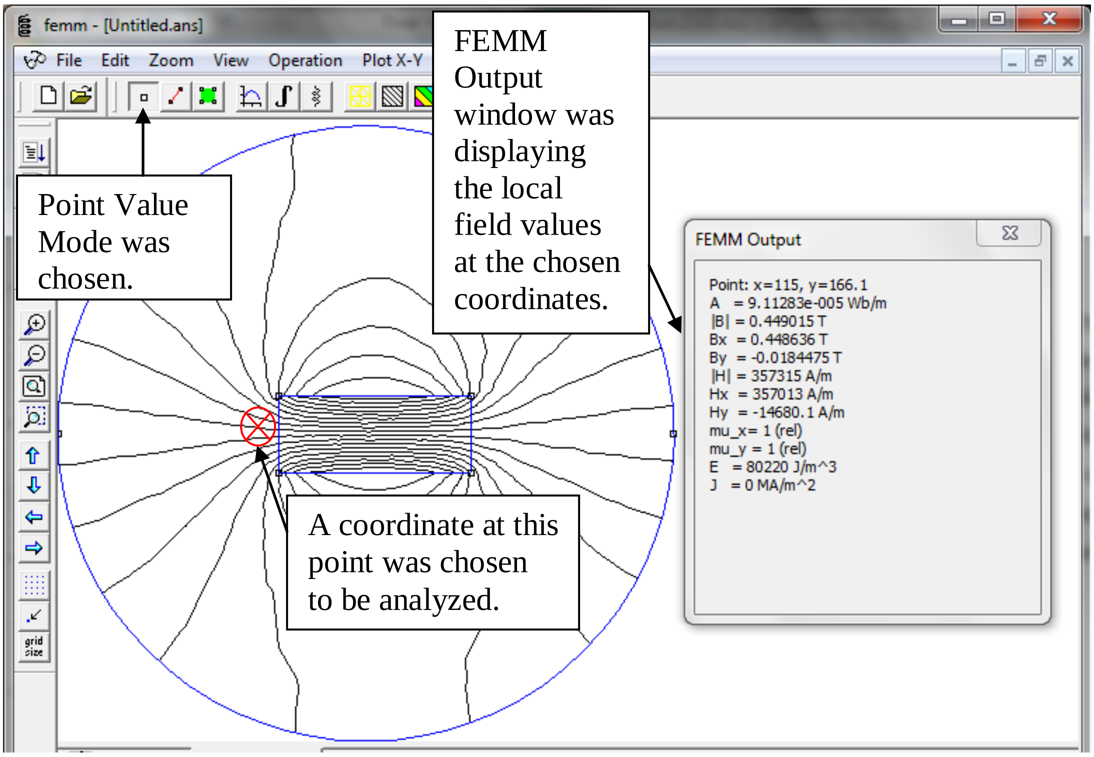

Figure 3.27: Data Extraction for Point Values Mode

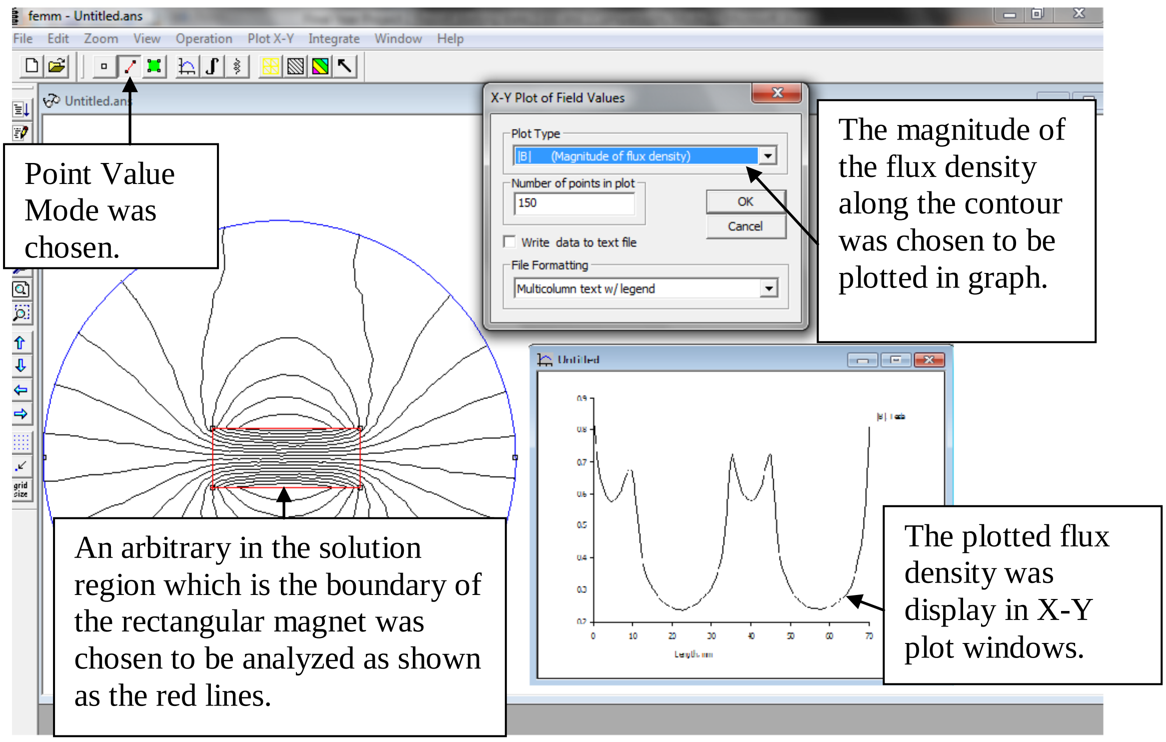

Figure 3.28: Data Extraction for Contour Mode

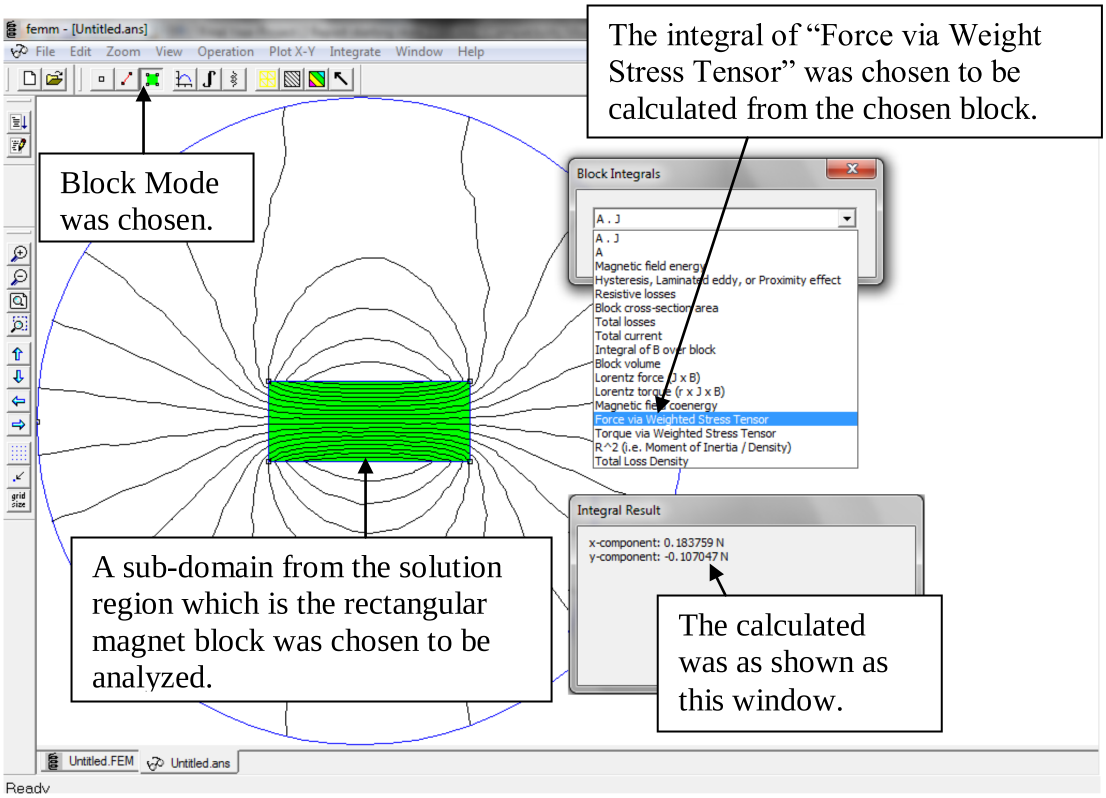

Figure 3.29: Data Extraction for Block Mode

3.4.4 Lua Scripting

A simple Lua Scripting Programming method has been used in the software simulation throughout this project. Lua is a powerful, fast, lightweight and embeddable scripting language which is widely used in many application or industry. The Lua Extension Language has been used to add scripting/batch processing facilities to FEMM. The Interactive Shell can run scripts through the Open Lua Script selection on the file menu as shown as below figure 3.30 and the Lua commands can be directly entered to the Lua Console Windows. Lua is an open-source scripting languages, therefore the source code for Lua and Detail documentation about programming in Lua can be contained from Lua Homepage. In a simple manner, the Lua programming has the specific function to manipulate the file in both pre- and post-processor in order to achieve the desired circumstance or outcome during the simulation, for the example, to simulate the rotor to rotate by 360^{o} and retrieved the necessary data such as Torque values during the rotation of the rotor.

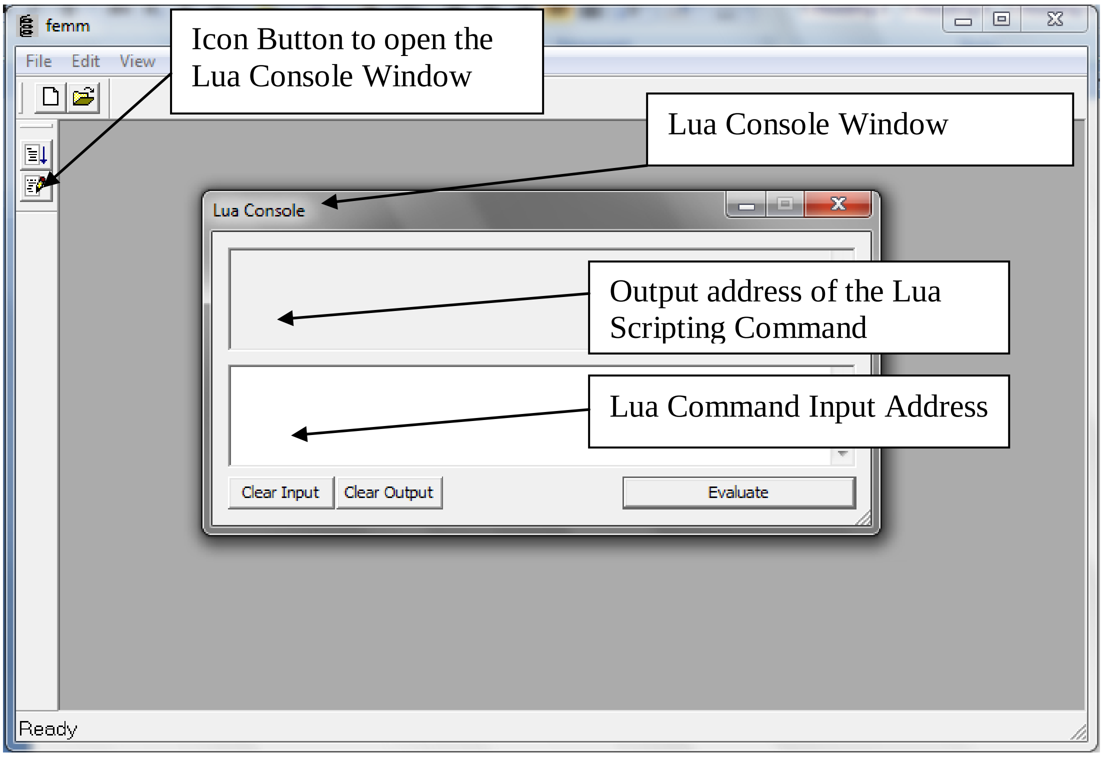

Figure 3.30: Software Layout for the Lua Scripting Feature

3.4.5 Process Flow of Software Simulation Process

Throughout the investigation, various simulations that related to the study and hypothesis of free energy magnet motor were conducted for study and analysis. The simulation process had gone through the above mentioned process. Below figure 3.31 is the flow chart while performing the software simulations.

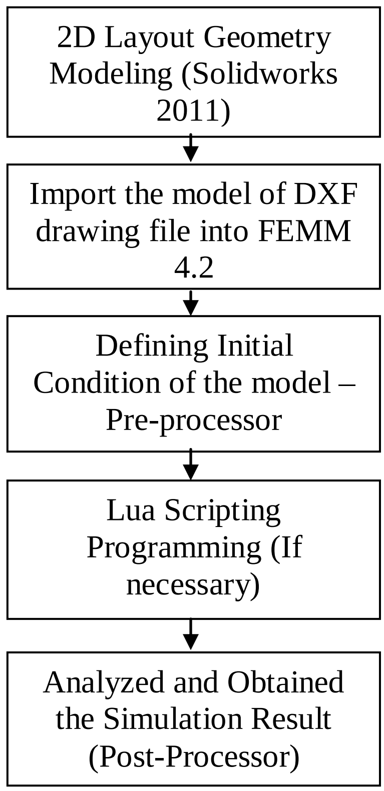

Figure 3.31: Flow Chart of Software Simulation Process

Several simulations such as the simulation of Howard Johnson's motor, simulation of experiments that related to the magnetic perpetual motion study and simulation on the developed prototype had been performed and the result of simulation had been studied and compared with the actual result.

3.5 Progress of Simulation

3.5.1 Simulation on Howard Johnson Motor

Throughout the investigation, the research had been conducted on simulating and modelling the Howard Johnson's Motor by using FEMM 4.2 and Solidworks 2011 Software.

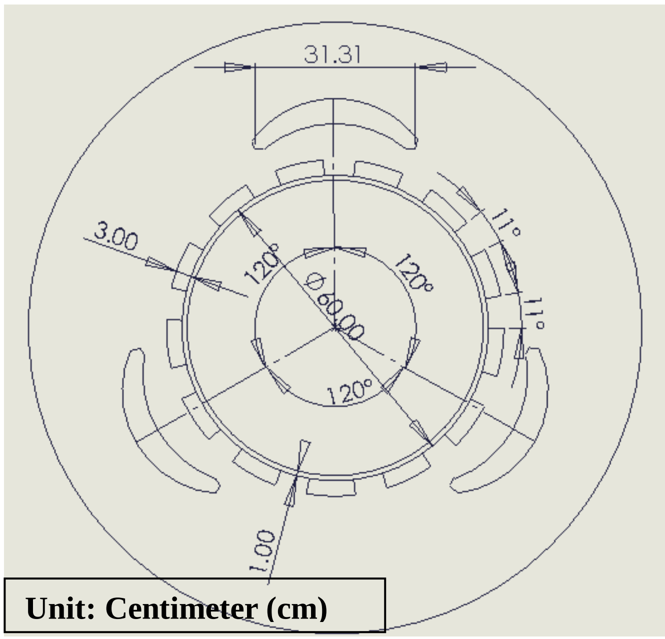

Figure 3.32: Dimension of Howard Johnson's Motor Design

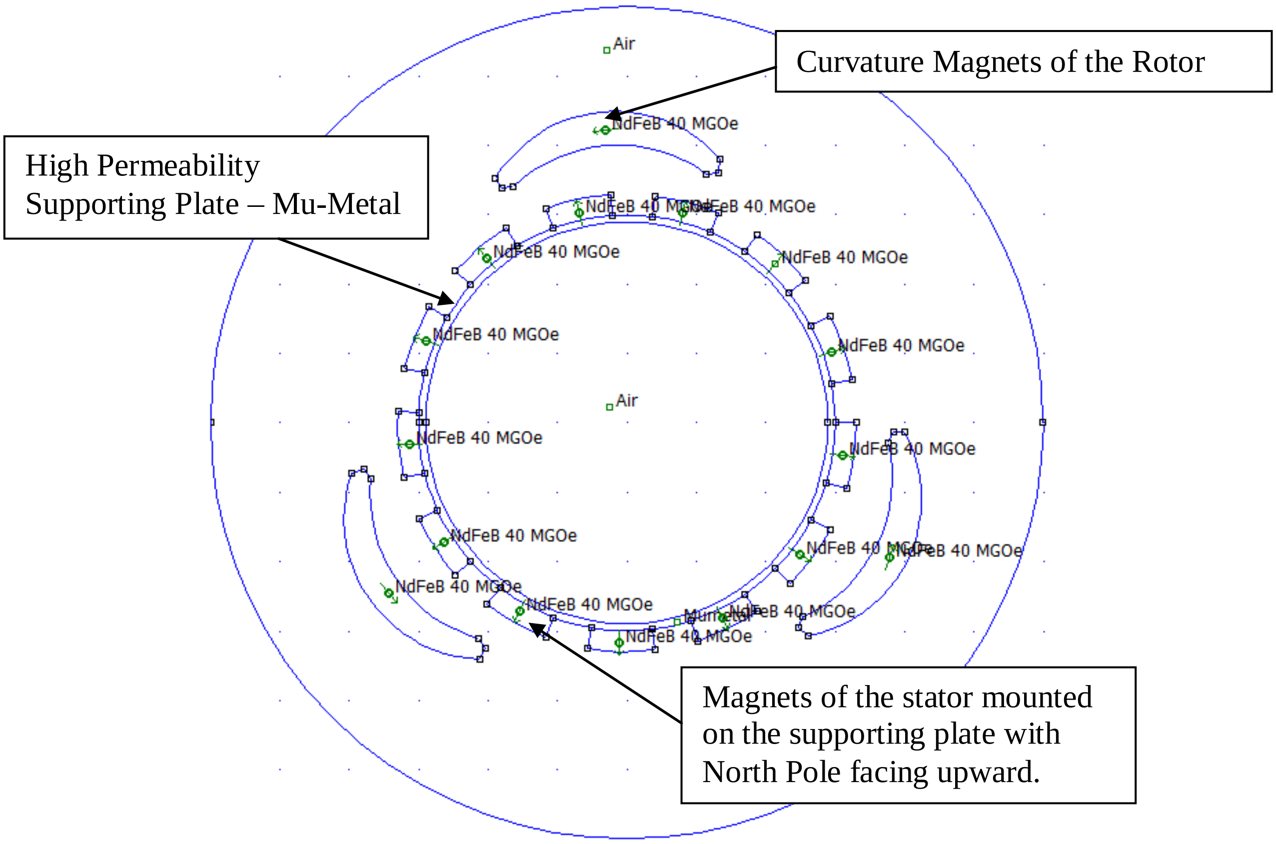

Figure 3.33: Geometry Model of Howard Johnson Motor

The above figure 3.32 is the 2D design layout of the geometry model of Howard Johnson's Motor which was drawn by using Solidwork 2011. The design of the Howard Johnson's Motor was referred to the patent of (Johnson, Permanent Magnet Motor, 1979).

According to the patent, the rotary motor consists of rotor which consists of curvature magnets with sharp and trailing edge and stator magnets was mounted upon a supporting plate which having a properties of high magnetic permeability. The North Pole of the magnets were configured to be facing upward where South Pole is facing toward the supporting plate. Therefore, the design for the geometry model was defined as shown as above figure 3.32 and 3.33. The magnets that were implemented in the simulation were Neodymium magnets where the grade is NdFeB 40 MGOe. The North Pole of the magnets were configured facing upward and South Pole was mounted on high permeability material which is Mu-metal. The rotor then was designed to have a curvature shape with sharp and trailing edge and consisted of 3 magnets which having 120^{o} offset. The green directional arrow line indicates the

magnetization direction of the magnets where the direction that arrow pointing is North Pole. The magnetization direction of the curvature magnets were tangential direction of the rotor rotational movement.

After the pre-processing of the simulation was done, the problem was solved and analyzed and the simulation data were extracted from the magnetic post-processing step. A Lua Scripting Programming was performed in order to extract the Torque Values (T) of the Rotor for every 1^o of rotational step angle. The rotor was programmed to rotate counter-clockwise by angle of 360^o and the Torque Values were extracted in every step angle of 1^o. In succession, the Torque Values would be used to calculated the Work Done (J) of the rotor for a complete 360^o rotation and the result was plotted into graph and further discuss in chapter 4.

The Lua Scripting Command for the above operation is as shown as follows:

mi_probdef (0,"millimeters","planar",1e-008, (10),(30),(0)); *Define intial condition and configuration for pre-processor step*

A=0; *loop the program to run 360 times, in order to achieve the rotor to rotate by 360^o*

for A=0, 360 do

mi_selectgroup(2); *The rotor was defined as Group 2.*

mi_moverotate(0,0,1); *Rotate the selected block by 1 degree per program loop.*

mi_analyze(); *Analyze the pre-processing geometry model of HJ Motor Model*

mi_loadsolution(); *Load the solution for post-processing solution*

mo_groupselectblock(2); *Select the desired block(rotor).*

T = mo_blockintegral(22); *Defined T as the torque values and calculate integral torque value of the selected block.*

print(T); *Display the obtained torque result.*

end; *End the program after it has looped for 360 times*

The figure 3.34 below shows the visualization of magnetic field distribution and flux density of the geometry model of Howard Johnson’s Motor Simulation in Post-Processing Step.

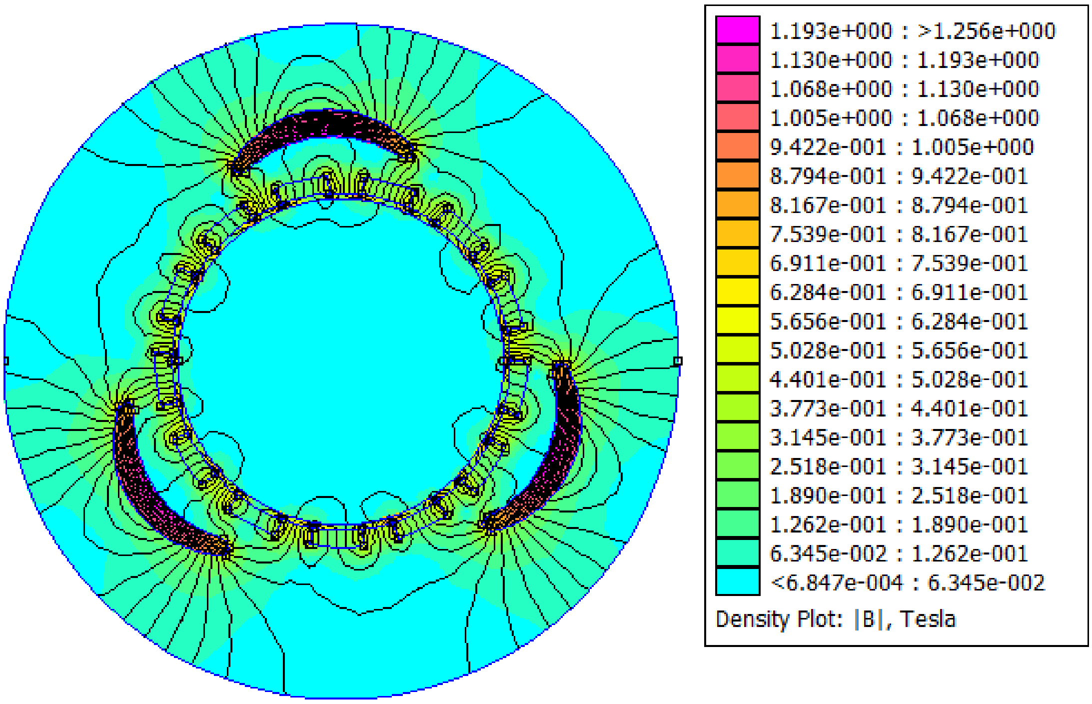

Figure 3.34: Magnetic Field Distribution and Flux Density of HJ Motor Model

3.5.2 Simulation on Magnetic Imbalance Forces

The constant imbalance of the magnetic force is the principle that powered the Howard Johnson's Motor had been simulated and studied as well. The Magnetic Imbalance Forces had been simulated by using FEMM 4.2 software to study and analyze the characteristics of Magnetic Imbalance that occurred in Howard Johnson's Motor. Figure 3.35 below showing the 2D geometry model of the simulation.

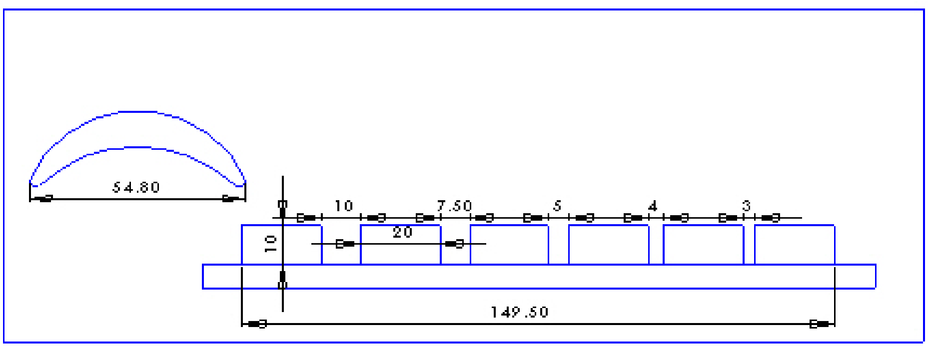

Figure 3.35: Magnetic Constant Imbalance 2D Geometry Drawing

The simulation will be performed by studying the actuator which is curvature magnets in 3 different locations above the stator magnets. Figure 3.26 below showing the 3 positions of the magnets that were performed throughout this simulation. The magnetization directions of the magnets were defined as illustrated green arrow lines as shown as figure below. The result of the simulation would be discussed in chapter 4.

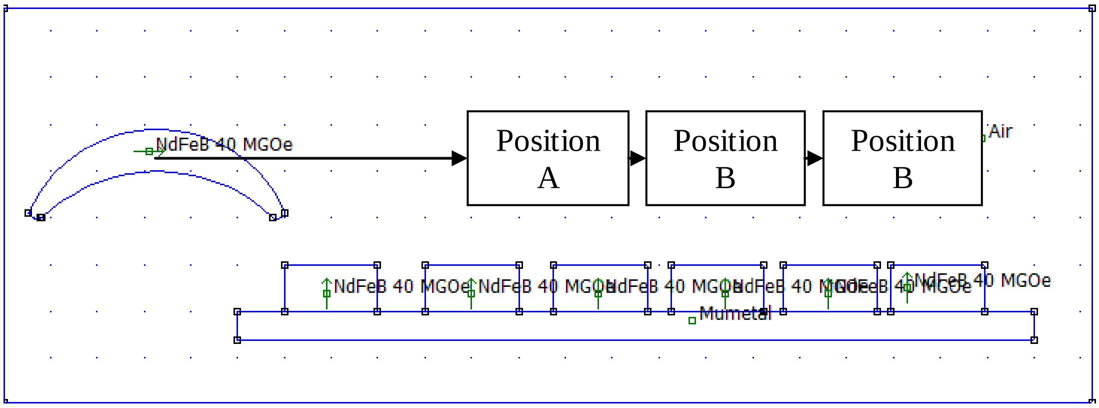

Figure 3.36: Magnetic Constant Imbalance Force – 3 tested positions

3.5.3 Simulation on Various Shapes of Magnets

As mentioned in the patent of (Johnson, Permanent Magnet Motor, 1979), the shapes of the magnets contribute some effect to the design of his invention. Therefore, a various shapes of magnets had been modelled and simulated by using Solidworks and FEMM. The result that obtained from the simulation was analyzed and compared. The various shapes of magnets that were used to model and perform in this simulation are rectangular, Quadrangle, Curvature with sharp edge and Curvature Shaped with blunt edge. Basically, the simulation of magnetic flux density were obtained and further to be compared and analyze. The Figures 3.37 to 3.40 as shown below are the geometry model and post-processing result for the above shapes.

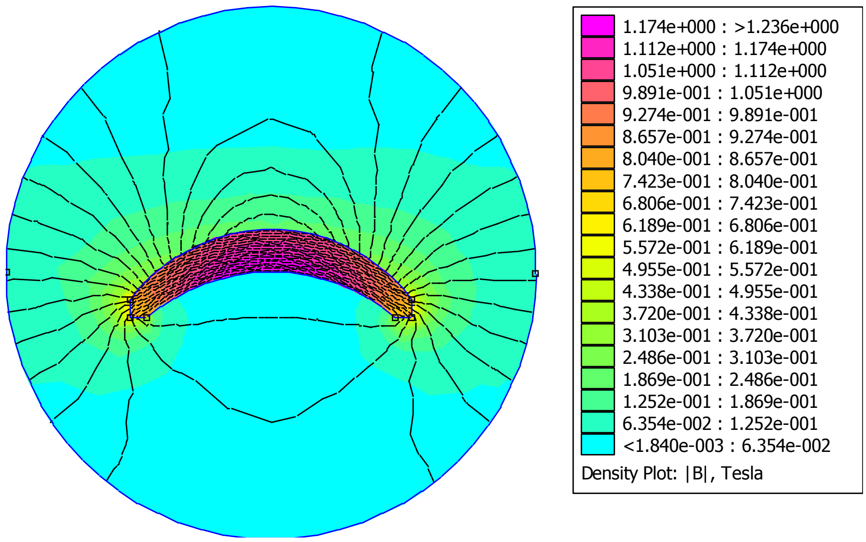

Figure 3.37: Curvature Magnet Shape with Sharp Leading Edge

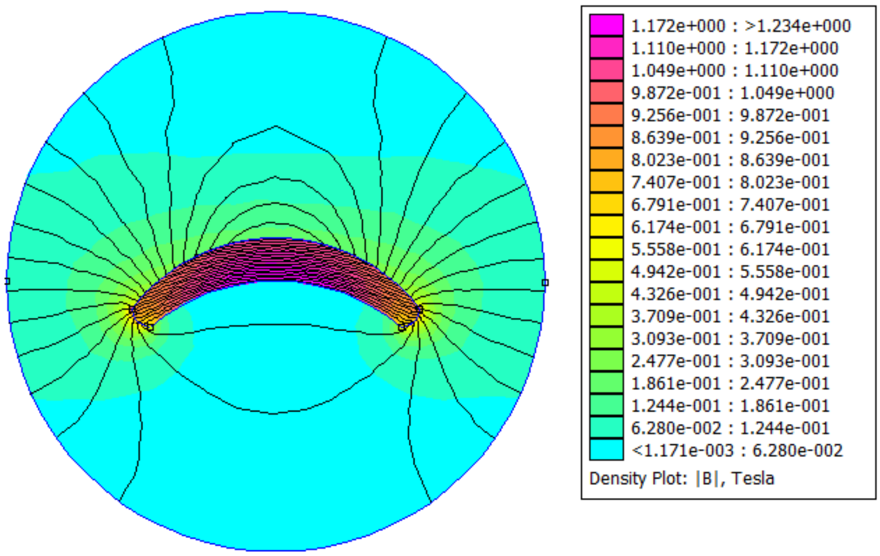

Figure 3.38: Curvature Magnet with Blunt Leading Edge

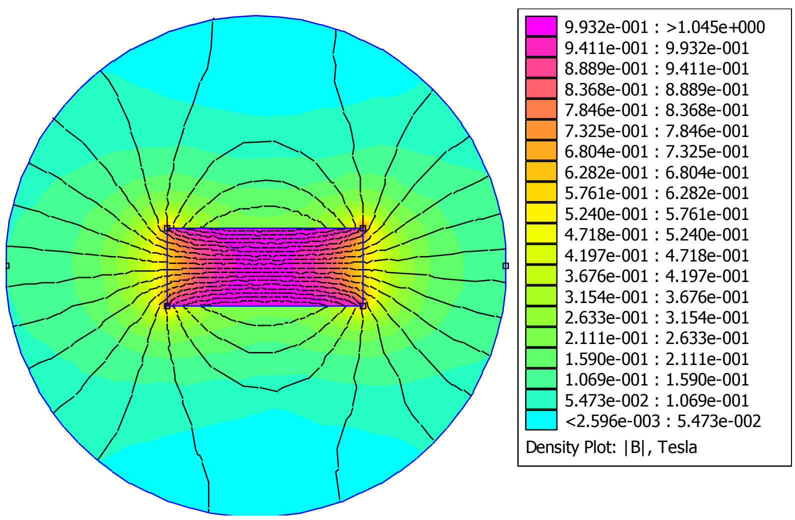

Figure 3.39: Rectangular Shape Magnet

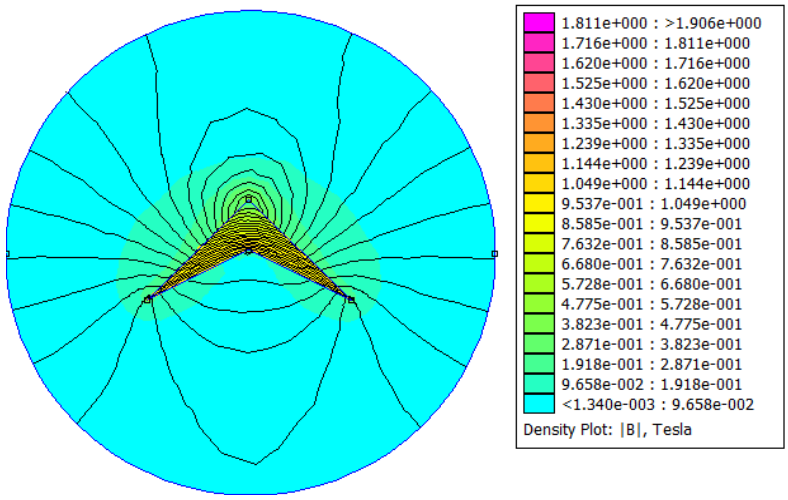

Figure 3.40: Quadrangle (Boomerang Shape) Magnet

The magnitude of the Flux Density had been plotted by using contour mode feature in FEMM and the graph result was illustrated and discussed in chapter 4.

3.5.4 Simulation on Magnetic Push-Pull Experiment

The procedure of this experiment had been introduced in section 3.3.1. A simulation of this experiment had been conducted to compare with the experimental result. Figure 3.41 as shown below is the geometry model of the experiment. The configuration of the simulation was simulated by using Neodymium Magnet – NdFeB 40 and the moveable magnet was set to move in horizontal direction at the downward of the fixed magnet. The magnetic reaction forces which is Fx for the moveable magnet that endures the repulsive tangential force and Fy for the fixed magnet that endures the repulsive axial force. The Fx and Fy values were extracted from the post-processor from the simulation and plotted in a graph. A Lua programming had been implemented in this simulation to acquire the reaction forces where the moveable magnet moved toward the fixed magnet in every step distance of 1mm. The simulation result was further analyzed and discuss in chapter 4.

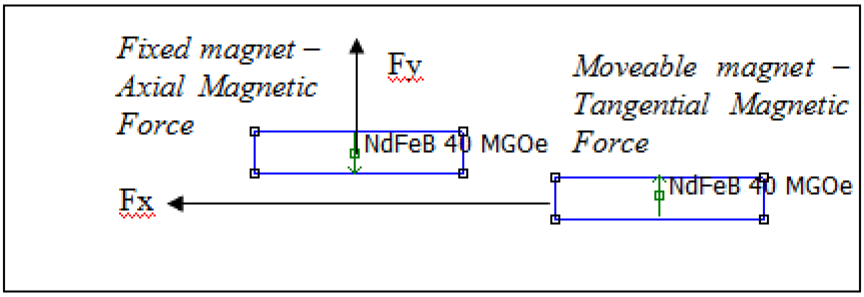

Figure 3.41: 2D Geometry Model of the Magnetic Push-Pull Experiment

3.5.1 Simulation on Magnetic Propulsion Experiment

The experiment of Magnetic Propulsion Experiment was conducted and the simulation of the experiment was performed to be compared and analyze. The figure 3.42 and 3.43 illustrated the geometry model and configuration of the experiment.

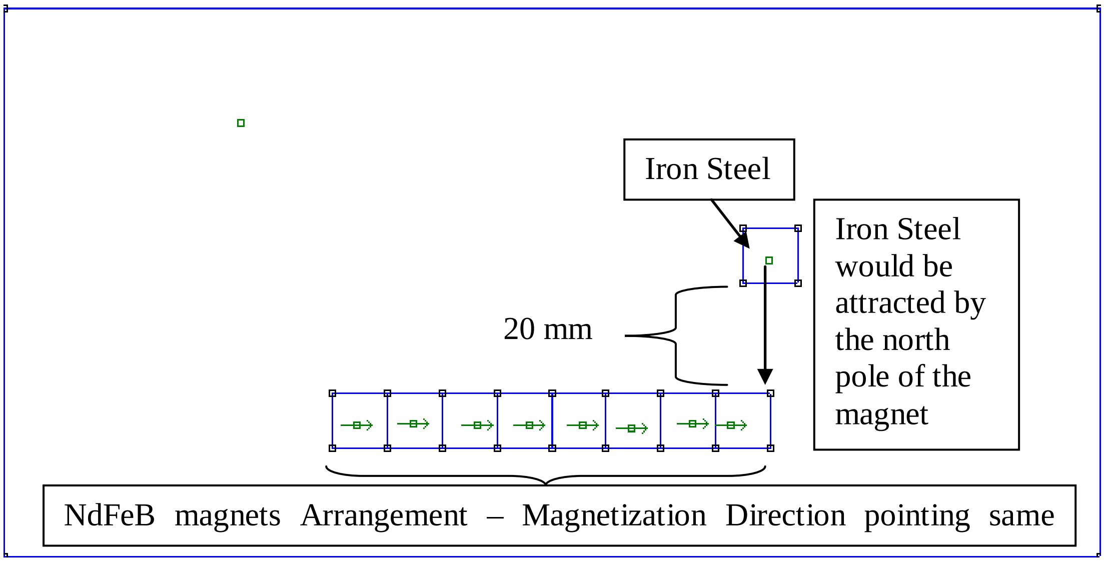

Figure 3.42: Geometry Model for 1st Test

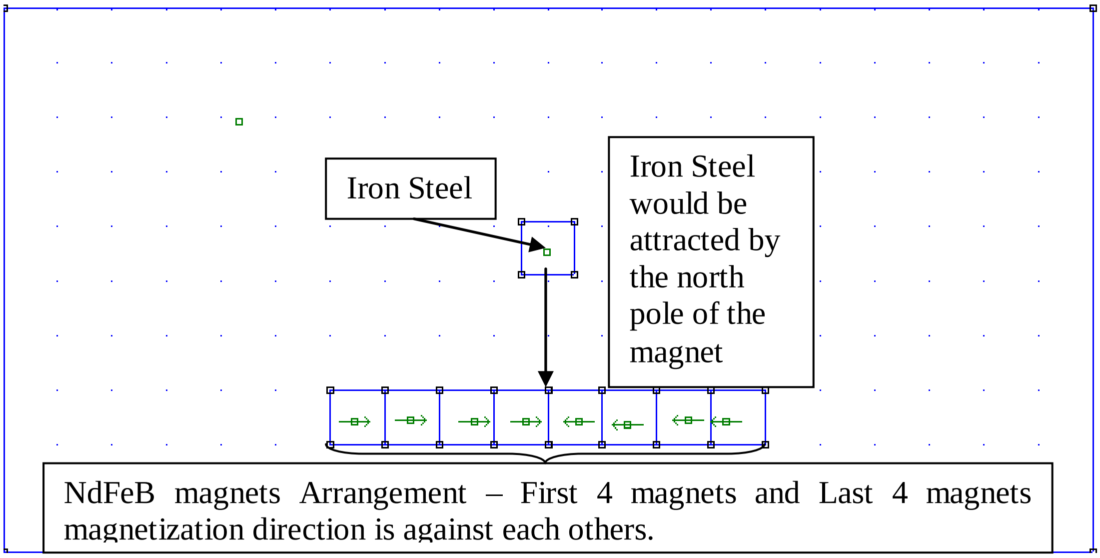

Figure 3.43: Geometry Model 2nd Test

The attraction forces that applied to the iron steel of the above 2 tests were extracted and display in chapter 4 for analyzing and discussing.

3.5.2 Simulation on Magnets in Linear Arrangement

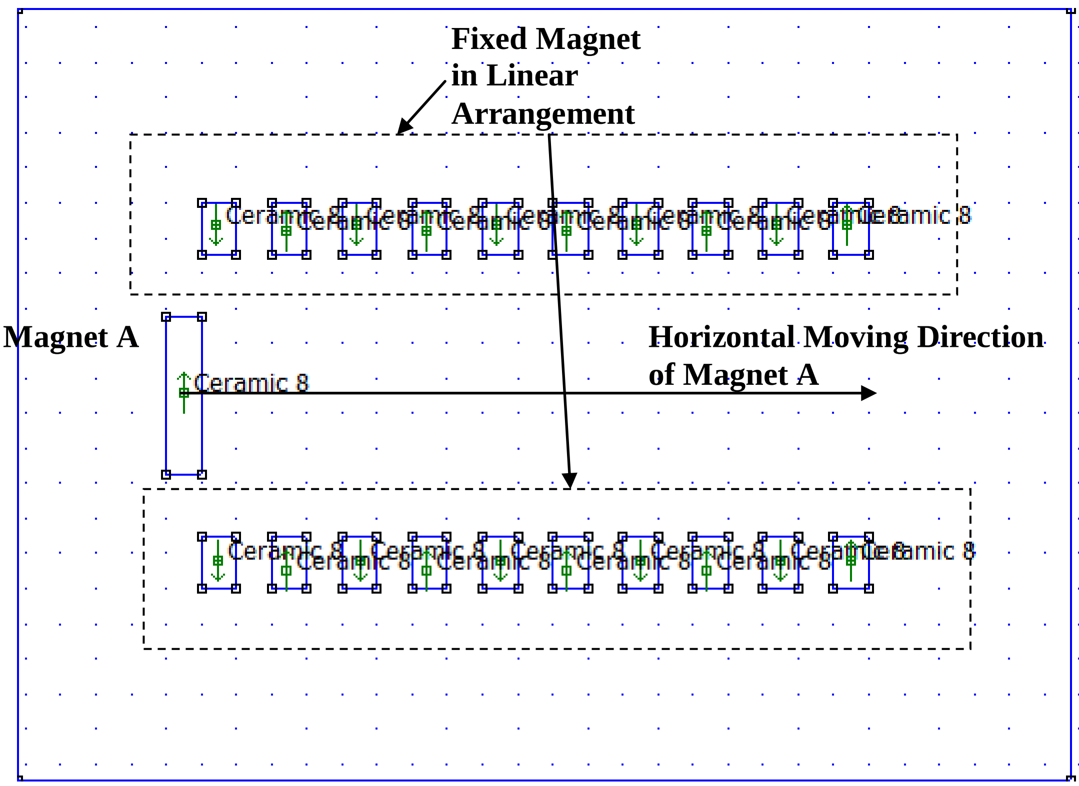

Figure 3.44: 2D Geometry Model of Magnets in Linear Arrangement

The geometry model diagram of the simulation of the magnet in linear arrangement is as shown as above figure 3.44. The simulation was configured by using ceramic magnet and magnet A was programmed by using Lua scripting to move in the horizontal direction pass through the fixed magnets. The magnetization direction of the magnets is illustrated and can be visualized from the green arrow lines as shown as above figure 3.44. The post-processing simulation data which are Reaction Force Fx and Fy of magnet A. The Horizontal Reaction Force was extracted and the Work done was calculated accordingly and plotted in a graph. A Lua programming had been implemented in this simulation to acquire the reaction forces of magnet A in every step moving distance of 1mm. The simulation result was further analyzed and discuss in chapter 4.

3.5.1 Simulation on Magnets in Circular Arrangement

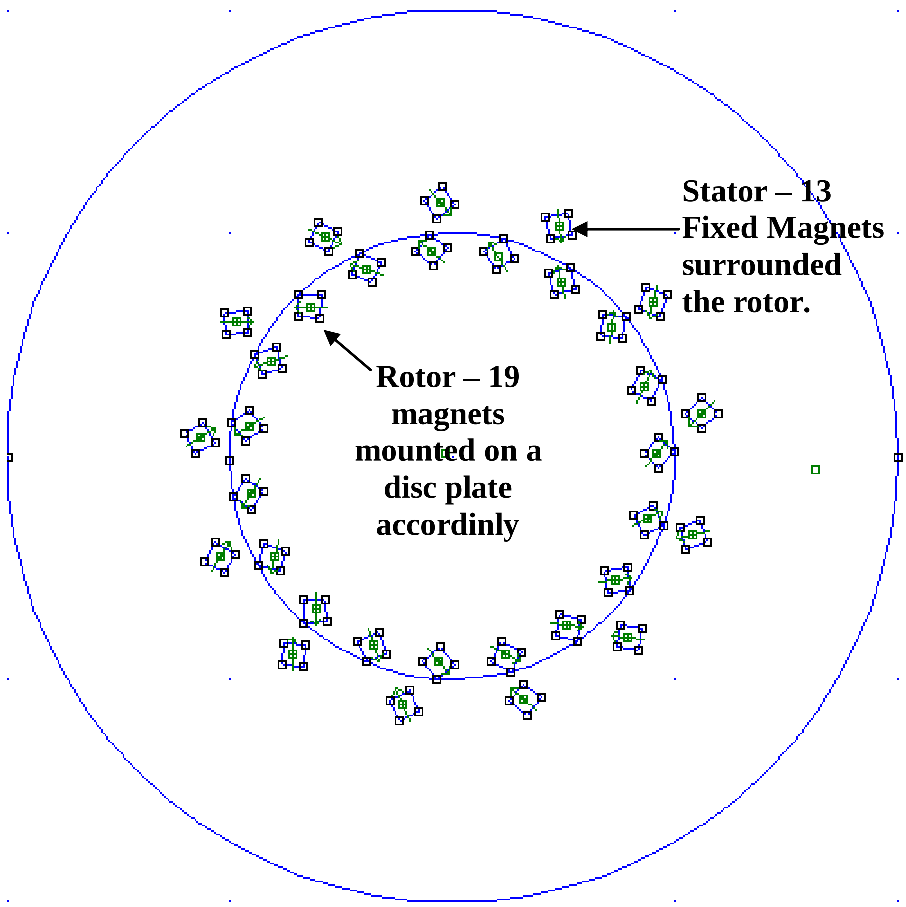

Figure 3.45: 2D Geometry Model of Magnets in Circular Arrangement

The 2D geometry model diagram of the simulation of the magnet in circular arrangement was based on hypothesis of creating perpetual motion is as shown as above figure 3.45. The simulation was configured by using Neodymium magnet. The design of the model consists of a rotor where 19 magnets were mounted on the plate and stator where 13 magnets were fixed surrounding the rotor accordingly.

After the pre-processing of the simulation was done, the problem was solved and analyzed and the simulation data were extracted from the magnetic post-processing step. A Lua Scripting Programming was performed in order to extract the Torque Values (T) of the Rotor for every 1^{o} of rotational step angle. The rotor was programmed to rotate in clockwise by angle of 360^{o} and the Torque Values were extracted in every step angle of 1^{o}. In succession, the Torque Values would be used to calculated the cumulative Work Done (J) of the rotor for a complete 360^{o} rotation and the result was plotted into graph and further discuss in chapter 4.

3.5.2 Simulation on Halbach Array in Linear Arrangement

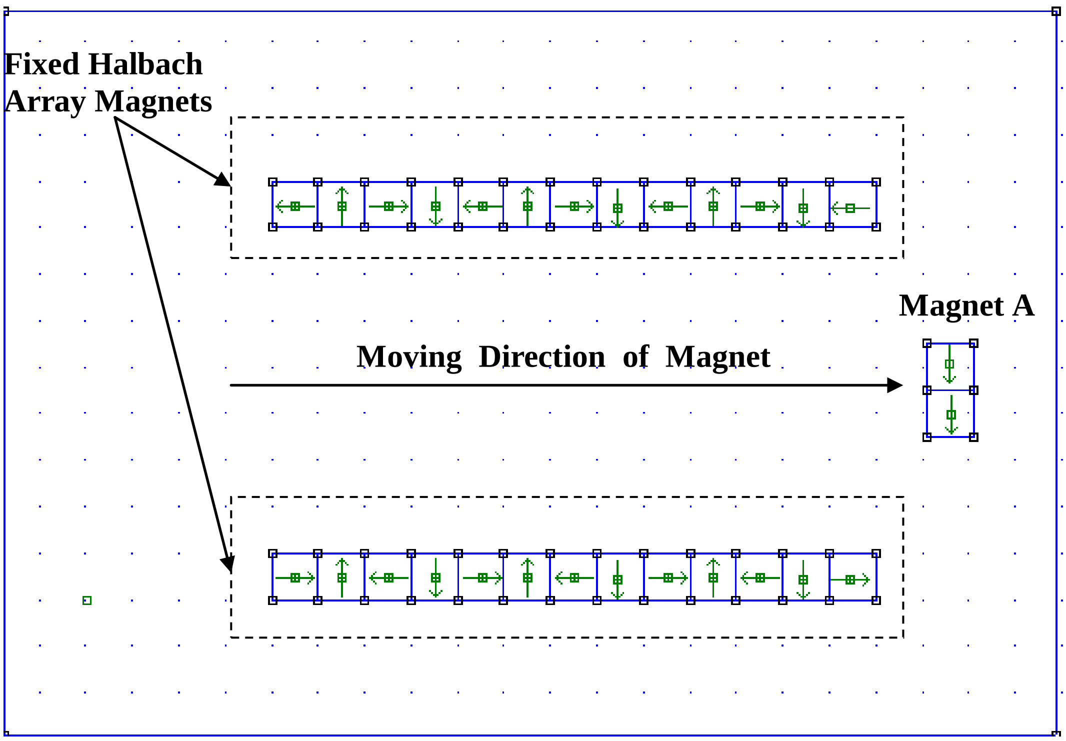

Figure 3.46: 2D Geometry Model of Linear Halbach Array Arrangement

The geometry model diagram of the simulation of Halbach Array Linear Arrangement is as shown as above figure 3.46. The simulation was configured by using Neodymium NdFeB 40 Magnets and magnet A was programmed by using Lua scripting to move in the horizontal direction pass through the fixed magnets. The magnetization orientation of the Halbach Array Magnets was illustrated and can be visualized from the green arrow lines as shown as above figure 3.46. The post-processing simulation data which are Reaction Force Fx and Fy of magnet A. A visualization of the magnetic field distribution of the Halbach Array is as shown as below figure 3.47.

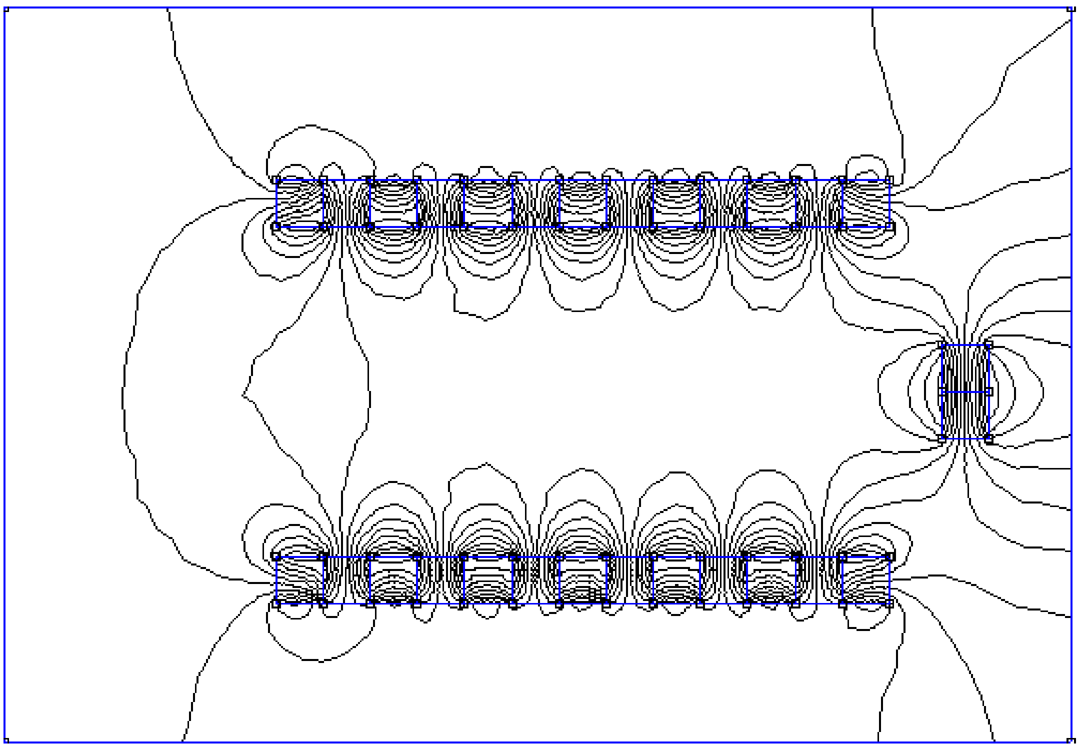

Figure 3.47: Magnetic Distribution of Linear Halbach Array Arrangment

The Horizontal Reaction Force was extracted and the Work done was calculated accordingly and plotted in a graph. A Lua programming had been implemented in this simulation to acquire the reaction forces of magnet A in every step moving distance of 1mm. The simulation result had been analyzed and discussed in chapter 4.

3.5.3 Simulation on Halbach Circular

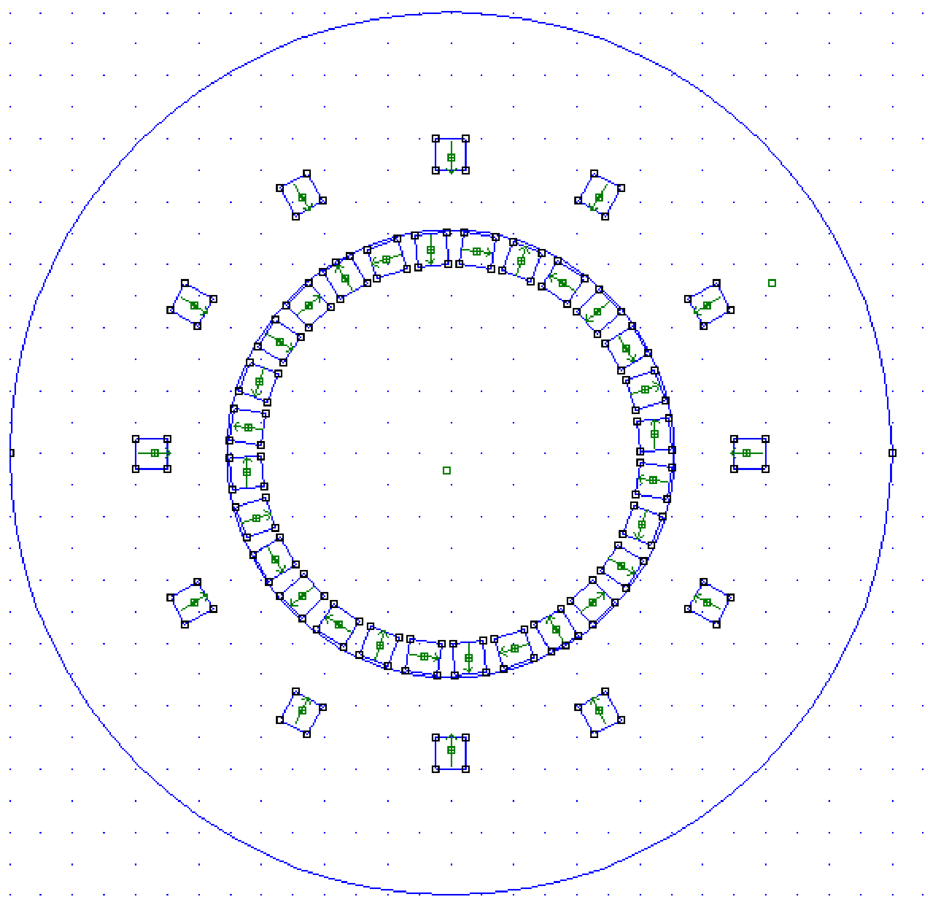

Figure 3.48: 2D Geometry Model of Circular Halbach Array Arrangement

The above figure 3.48 is the 2D design of the geometry model of Halbach Array in circular arrangement. Neodymium NdFeB Magnets were configured to be performed in the simulation. The rotor consists of 28 Halbach Array arrangement magnets were mounted circularly on the disc plate and the stator consists of 12 magnets were fixed surrounded the rotor. The magnetization directions of the magnets were illustrated and can be visualized as the green arrow lines as above figure 3.48.

After the pre-processing of the simulation was done, the problem was solved and analyzed and the simulation data were extracted from the magnetic post-processing step. Lua Scripting Programming was performed in order to extract the Torque Values (T) of the Rotor for every 1^{o} of rotational step angle. The rotor was programmed to rotate counter-clockwise by angle of 360^{o} and the Torque Values

were extracted in every step angle of 1^o. The extracted torque values was plotted in graph and further to be discussed and analyzed in chapter 4.

3.6 Work Done

The work done equation for the analysis is formulated by using the equation as shown as follows:

For the linear displacement, the equation of Total Work Done is interpreted as the summation of the each different forces at differ position multiply by the step travel distance of the moving part as the reaction force is vary in at different position in the system.

Work done Equation for linear configuration,

$$W_T = \sum_{i=0}^{n} F_i \times d$$

W_T is the total work done where the unit is in N.m

F_i is the Reaction Force act on the moving part where the unit is in Newton (N).

d is the step distance travel of the moving part where the unit is in meter(m).

The work done in rotational displacement, the equation is interpreted as the summation of Torque (T) multiply by the step angular displacement (θ) expressed in radians.

Work Done Equation for Rotational Configuration:

$$W_T = \sum_{i=0}^{n} T_i \times \theta$$

W_T is the total work done where the unit is in N.m

T_i is the Torque act on the rotating part where the unit is in Newton (N).

θ is the step angular of the moving part where the unit is in radian.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Howard Johnson's Motor Simulation

4.1.1 Result and Analysis

The figure 4.1 is showing the post-processed result of the simulation. The relationship of the magnetic field distribution and flux density between the rotor and stator can be visualized in the figure 4.1 below.

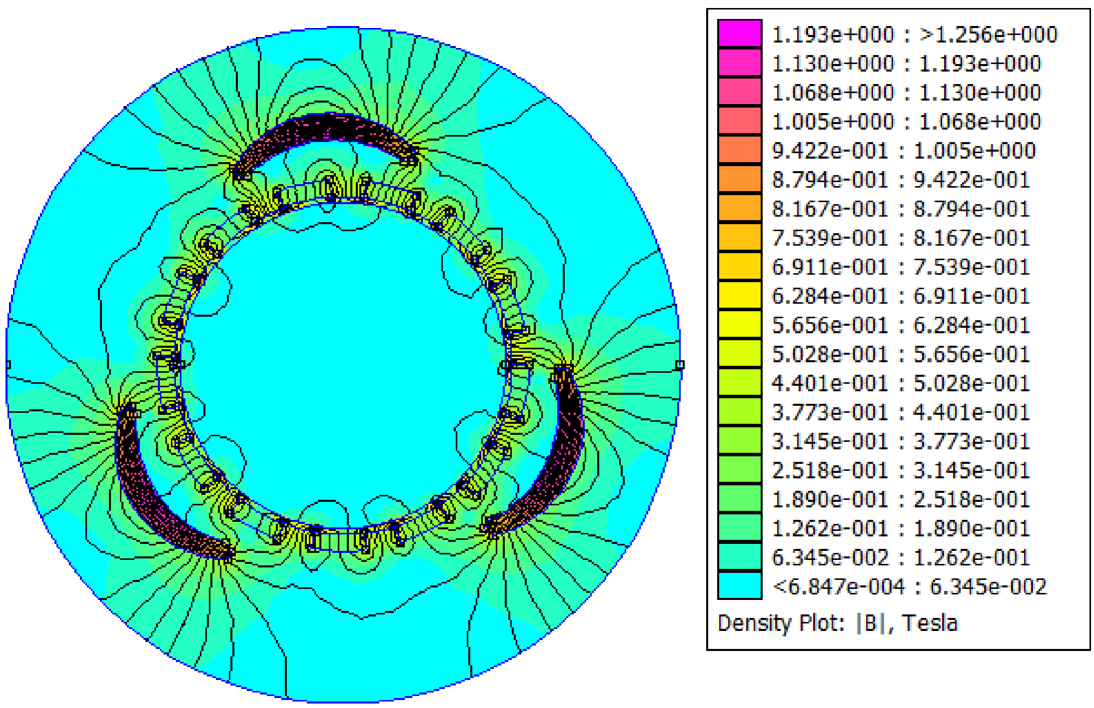

Figure 4.1: Visualization of Magnetic Field Distribution and Flux Density of Howard Johnson's Motor

The rotor was programmed to complete a revolution of 360° and the torque of the rotor was extracted accordingly and the work done was calculated and plotted in a graph as shown as below figure 4.2. The comparison of the torque and work done were illustrated as figure 4.3.

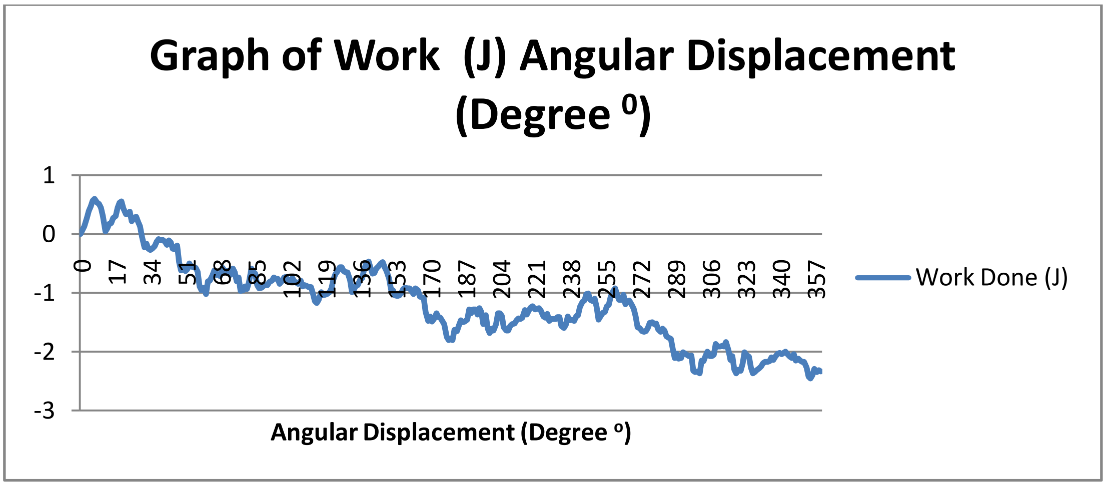

Figure 4.2: Graph of Work Done versus Angular Displacement of the rotor of Howard Johnson's Motor

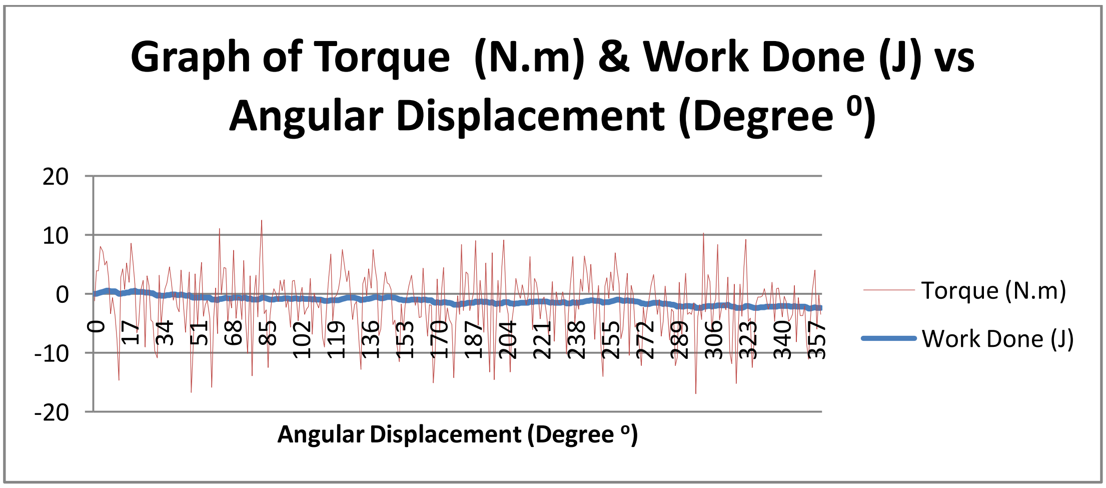

Figure 4.3: Comparison of Work Done & Torque versus the Angular Displacement of the rotor of Howard Johnson's Rotor

Based on the graph result, the work done has a net loss of approximately -2.3 Joules after complete a full revolution of 360° which had not reached the objective of the expectation of the simulation. Obviously, the rotor was doing a negative work where external forces are needed to apply to the rotor in order to achieve a full rotation of 360°. Based on figure 4.3, the distribution of the torques values are

located more on negative region than positive region. Therefore, result in a negative value to the net loss of the work done.

4.1.2 Discussion

The Johnson's uses the principle of a constant imbalance of the magnetic forces between the rotor and the stator where the only source of energy to drive the motor is come from the magnetic energy from the magnets. In order to maintain the continuous rotation of the rotor, the constant imbalance force must always maintain in the same direction. According to (Johnson, Permanent Magnet Motor, 1979), the air gap between the magnets from stator and the shape of the curvatures from rotor is very important in creating the permanent imbalance force.

The reasons that causing the net loss of work done occurred in the simulation is probably the air gap of the stator and curvature of the actuator magnets were not configured properly during the simulation. As the patent of Johnson's motor did not mentioned about the accurate dimensions of the design of the motor, the dimension of the geometry model was designed based on rough estimation. Therefore, it has become one of the reasons that causing the negative expectation from the simulation result. Besides that, the configuration of the stator magnets air gap and rotor magnets curvature is quite difficult to be setup which is another reason of net loss of work.

The most important matter to obtain a continuous rotation of the motor is that the flux density of the North Pole of the rotor curvature magnets must be always lower than the flux density of the South Poles. The shapes of the magnets play an important role to obtain the constant imbalance force condition. The shapes of the magnets would be discussed in section 4.3.

4.2 Simulation of Magnetic Constant Imbalance Force Simulation

4.2.1 Result and Analysis

It is believed that the configuration of the magnetic air gap and the shapes of rotor magnets create a magnetic off balance forces. The simulation had been performed to study the magnetic flux density, magnetic force distribution. The figure 4.4, 4.5 and 4.6 were showing the simulation result at position A, B and C correspondingly.

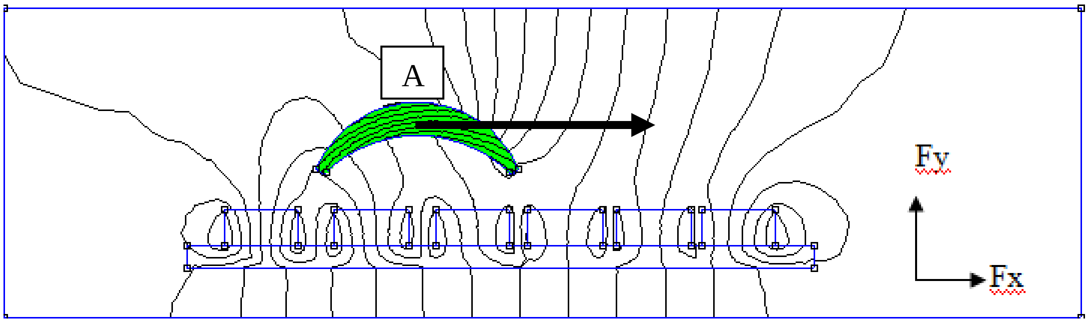

Figure 4.4: Magnetic Field Distribution between the Magnets at Position A

Table 4.1: Reaction Forces of the Selected Block at Position A

Horizontal Force (Fx)	0.788138 N
Vertical Force (Fy)	2.35284 N

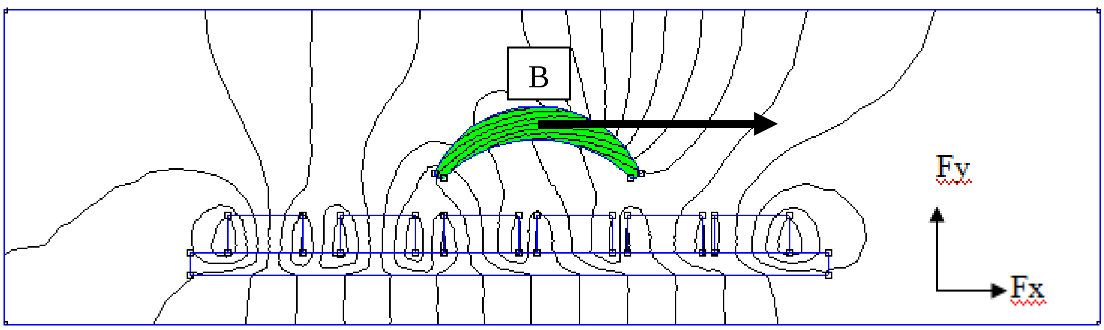

Figure 4.5: Magnetic Field Distribution between the Magnets at Position B

Table 4.2: Reaction Forces of the Selected Block at Position B

Horizontal Force (Fx)	1.31829 N
Vertical Force (Fy)	2.42701 N

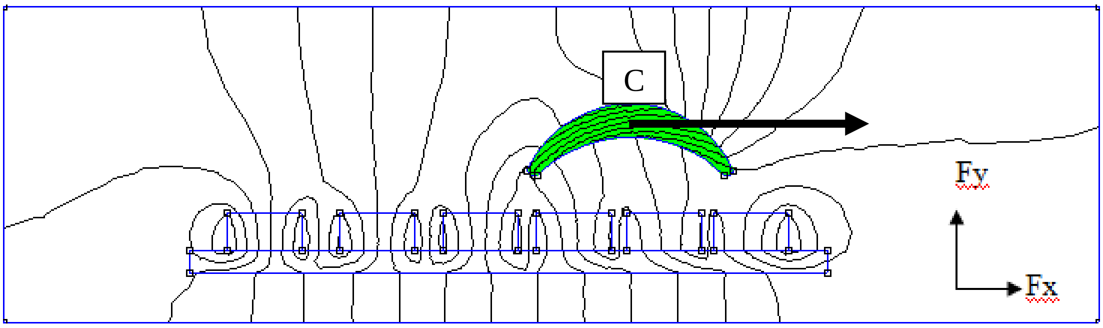

Figure 4.6: Magnetic Field Distribution between the Magnets at Position C

Table 4.3: Reaction Forces of the Selected Block at Position C

Horizontal Force (Fx)	4.42348 N
Vertical Force (Fy)	0.313031 N

The forces that acted on the actuator magnets were extracted from the simulated post-processor result. The horizontal and vertical forces were acquired and displayed as shown above correspondingly. The horizontal force of that acted on the actuator magnets were observed has increased at 3 different positions correspondingly, however, the vertical forces was observed decreasing in values. The reaction of the magnetic field which representing the relationship of magnetic reaction force can be visualized as above 3 figures.

4.2.2 Discussion

Based on the above results, the actuator magnets that undergo the magnetic reaction forces are always positive in values whereby it is obvious that magnet would move forward without any external force applied. Besides that, the increment and decrement of reaction force of the magnets are most probably caused by the magnetic flux of the stator magnets which acted on actuator magnet which can be visualized from the above simulation result. However, due to the limitation of knowledge, the above information was difficult to prove the magnetic imbalance force but only to prove that the actuator magnet was able to move forward without any external force applied.

4.3 Simulation on Various Shape of Magnet

4.3.1 Result and Analysis on Rectangular Shape Magnet

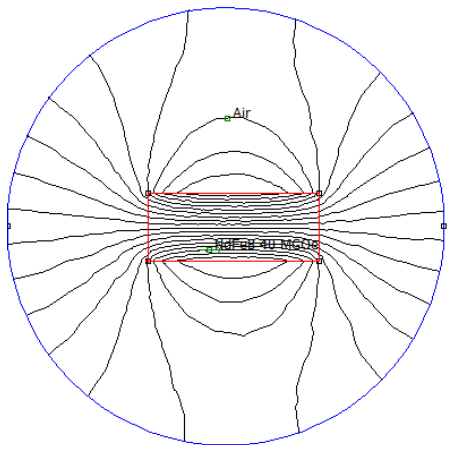

Figure 4.7: Magnetic Field of Rectangular Shape Magnet

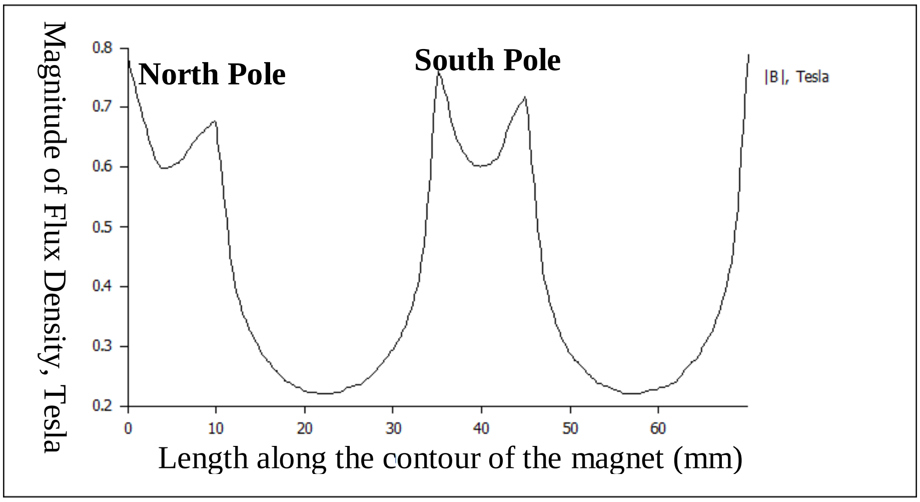

Figure 4.8: Plotted Graph for Magnitude of Flux Density along the Contour of Rectangular Magnet

The above figure 4.7 is showing the magnetic field lines of the rectangular magnet and figure 4.8 is showing the plotted graph of magnitude of flux density along the contour of the magnets. Based on the figure 4.8 result, the magnetic flux difference between the North Pole and South Pole is almost the same. Although there is a sunken at the North and South Pole at the graph result, however, the plotted flux density was observed to be symmetry and the magnetic imbalance force was not occurred at the rectangular shape of magnet.

4.3.1 Result and Analysis on Rectangular Curvature Magnet with Blunt Edge

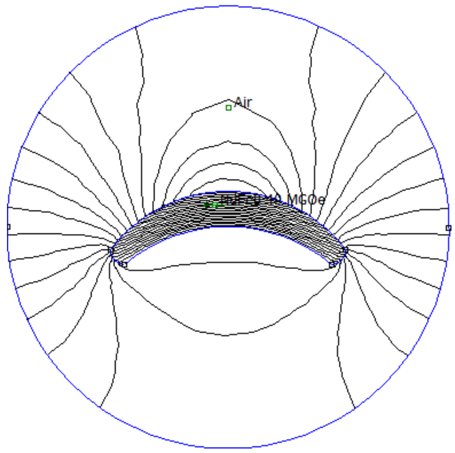

Figure 4.9: Magnetic Field of Curvature Magnet with Blunt Edge

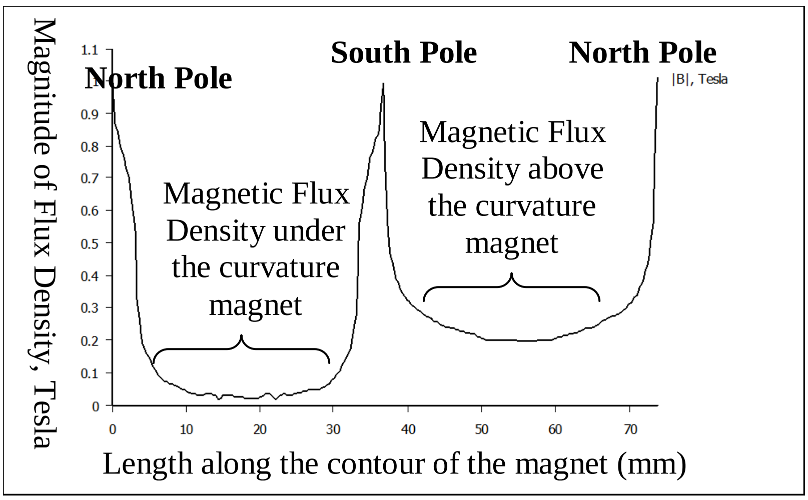

Figure 4.10: Plotted Graph for Magnitude of Flux Density along the Contour of Blunt Edge Curvature Magnet

4.3.1 Result and Analysis on Curvature Magnet with Sharp Edge

The above figure 4.9 is showing the magnetic field lines of the curvature magnet with blunt end and figure 4.10 is showing the plotted graph of magnitude of flux density along the contour of the magnets. Based on the figure 4.8 result, the magnetic flux difference between the North Pole and South Pole is almost the same. However,

the magnetic flux can be observed from the graph is more concentrated at the end edge of North and South Poles compared with rectangular magnet.

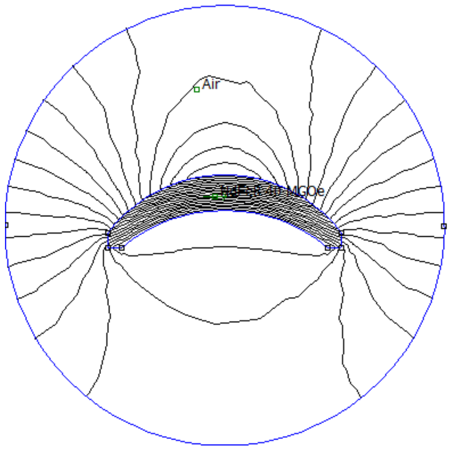

Figure 4.11: Magnetic Field of Curvature Magnet with Sharp Edge

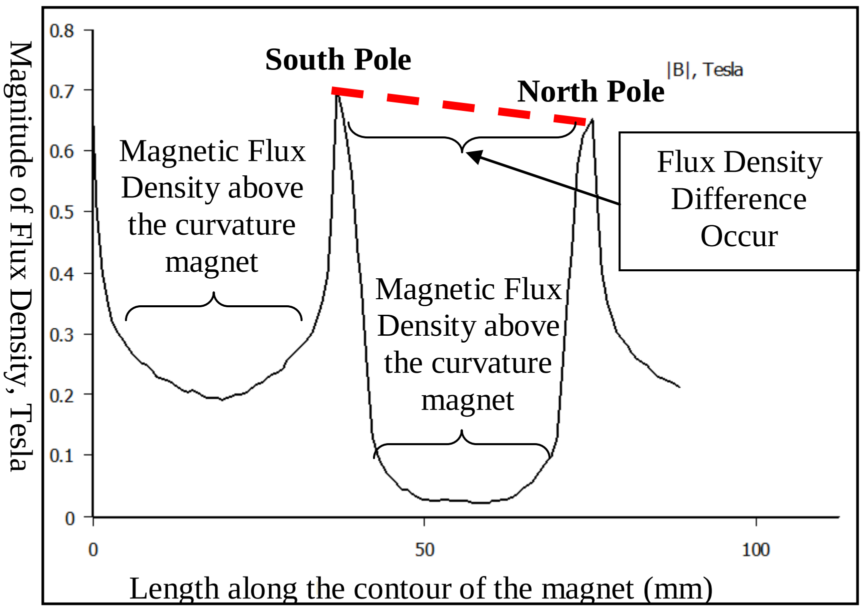

Figure 4.12: Plotted Graph for Magnitude of Flux Density along the Contour of Sharp Edge Curvature Magnet

The above figure 4.11 is showing the magnetic field lines of the curvature magnet with sharp end and figure 4.12 is showing the plotted graph of magnitude of flux density along the contour of the curvature magnets with sharp edge. Based on the figure 4.12 result, the magnetic flux difference between the North Pole and South Pole occurred slightly. The magnetic flux can be observed from the graph is more concentrated at the end edge of North and South Poles same as blunt edge curvature magnet.

4.3.1 Result and Analysis on Curvature Magnet with Sharp Edge

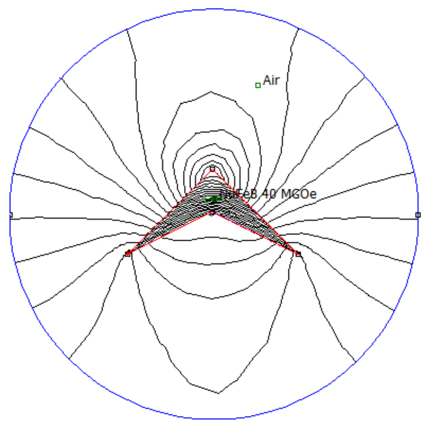

Figure 4.13: Magnetic Field of Quadruple Shape Magnet

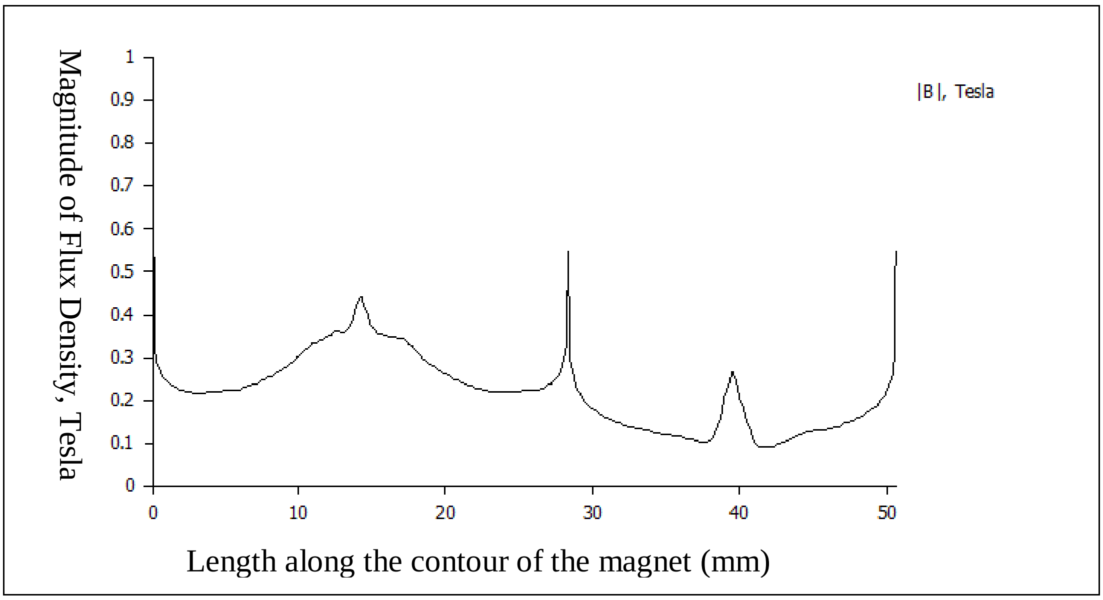

Figure 4.14: Plotted Graph for Magnitude of Flux Density along the Contour of Quadruple Shape Magnet

The above figure 4.13 is showing the magnetic field lines of the quadruple shape magnet and figure 4.14 is showing the plotted graph of magnitude of flux density along the contour of the magnet. Based on the figure 4.14 result, the distribution of magnetic flux is not regular and along the contour. Therefore, the magnetic flux is can be observed is not concentrated and the North and South Pole of the magnet.

4.3.2 Discussion on Simulation of Various Shape of Magnets

Based on the above result and analysis, the curvature magnet with sharp edge has the most appropriate result compare among the various shape of simulated magnets. As the magnetic flux density was concentrated at the North Pole and South Pole and there flux density difference between the North and South Pole was exist although the difference is very small. According to (Johnson, Permanent Magnet Motor, 1979) patent, the curvature magnets with sharp and trailing edge actually focus more magnetic energy on the North Pole and South Pole of the actuator magnets. However, in order to achieve a continuous rotation of the actuator magnets, by concentrating the magnetic energy at the end of magnet edge is not enough. A special configuration of the magnet is required for the actuator to rotate. Therefore, a hypothesis of flux density difference was assumed which would cause the imbalance forces and was proven in the simulation. The Howard Johnson's Motor actually can rotate continuously by using only the magnetic energy when the flux difference existed. The comparison of the edge of curvature magnets can be shown as below figure 4.15.

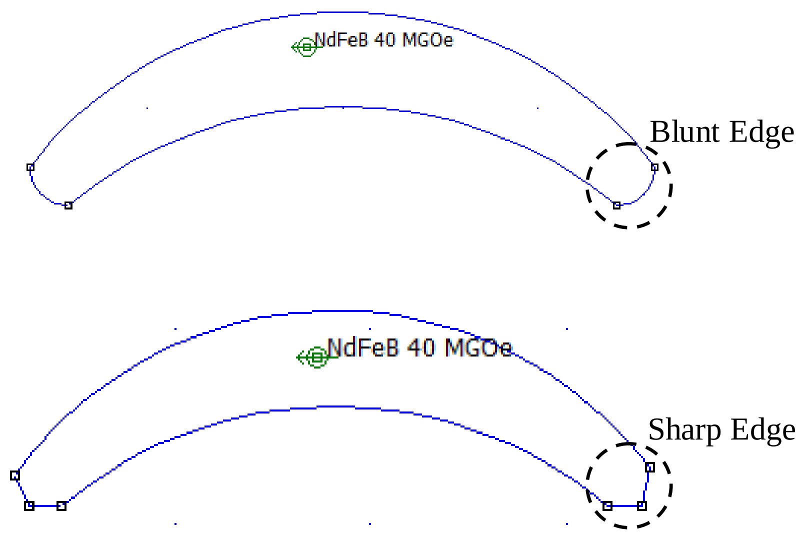

Figure 4.15: Comparison of Sharp and Blunt Edge Magnets

4.4 Simulation of Magnetic Push-Pull Experiment

4.4.1 Result and Analysis

The push-pull experiment had been conducted to study the natural properties of the magnets and the method to harness the magnetic energy and a FEMM simulation had been performed to be compared and analyzed with experiment result. A hypothesis had been made that the axial force is much larger than the tangential force in such magnet configuration method that by moving the magnet toward another magnet in the direction of tangent may create an axial force which is larger than the applied tangential force. This is meant by the input is larger than the output. Therefore, with a proper design and configuration of the magnets, an over-unity device also known as free energy device can be designed and developed.

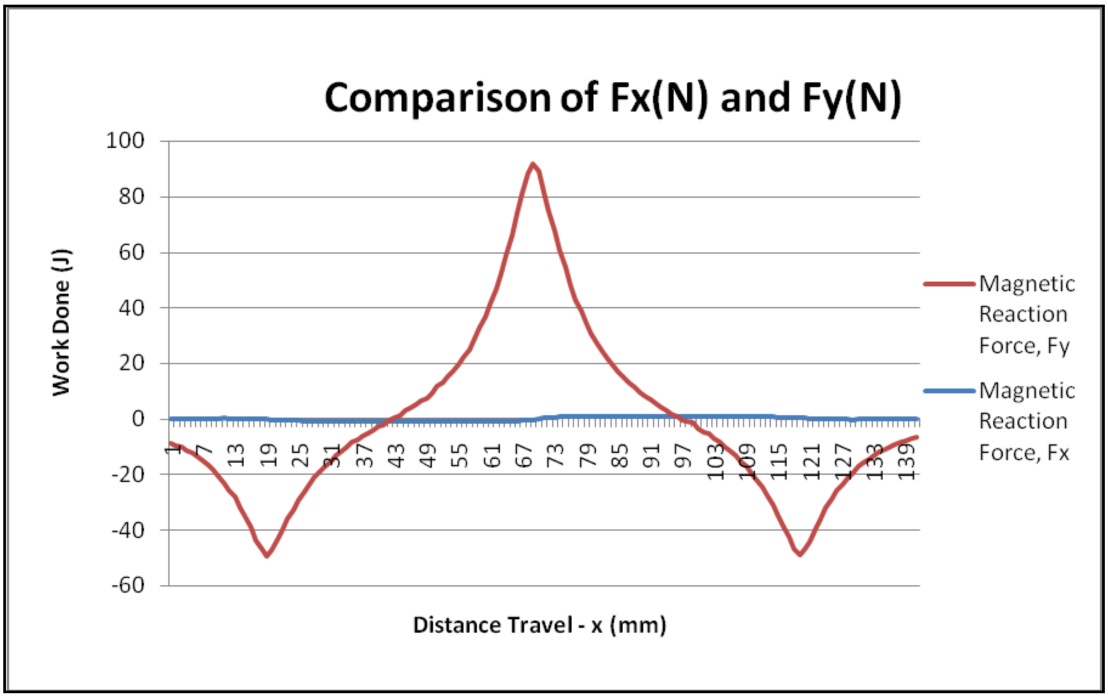

Figure 4.16: Comparison of Fixed Magnet Axial Reaction Force, Fy (N) and Moveable Magnet Tangential Reaction Force, Fx (N)

The magnetic reaction forces were collected from the simulation correspondingly by moving the moveable magnet toward the stationary magnet. The magnetic reaction forces of Fy from stationary magnet and Fx from moveable magnet were collected each time the moveable magnet moved toward the stationary

magnet in step distance of 1mm and the reaction forces values were plotted in a graph as shown as figure 4.16 above. By referring to the simulation result, it is obvious that the magnetic reaction axial force Fy of stationary magnet is greater than the magnetic reaction tangential force, Fx of moveable magnet. The magnetic repulsion force started to rise when the moveable magnet travelled at a distance of 40mm toward the stationary magnet approximately. When the moveable magnet travelled to exactly the bottom center of the stationary magnet, the repulsive force Fy values has the greatest magnitude which is approximately 90N. From the distribution of the magnetic reaction forces on the graph result, the magnitude of Fy is always greater than Fx.

Based on the above analysis, the produced output which is the stationary magnet which acts in tangential direction is always greater than the input which acts in axial direction. Therefore, this concludes that a proper configuration and arrangement of the magnet may lead to some sort of free energy which is known as the term of over-unity. By implementing this principle to some device, a magnetic energy from magnets seem like can be harnessed for producing free energy.

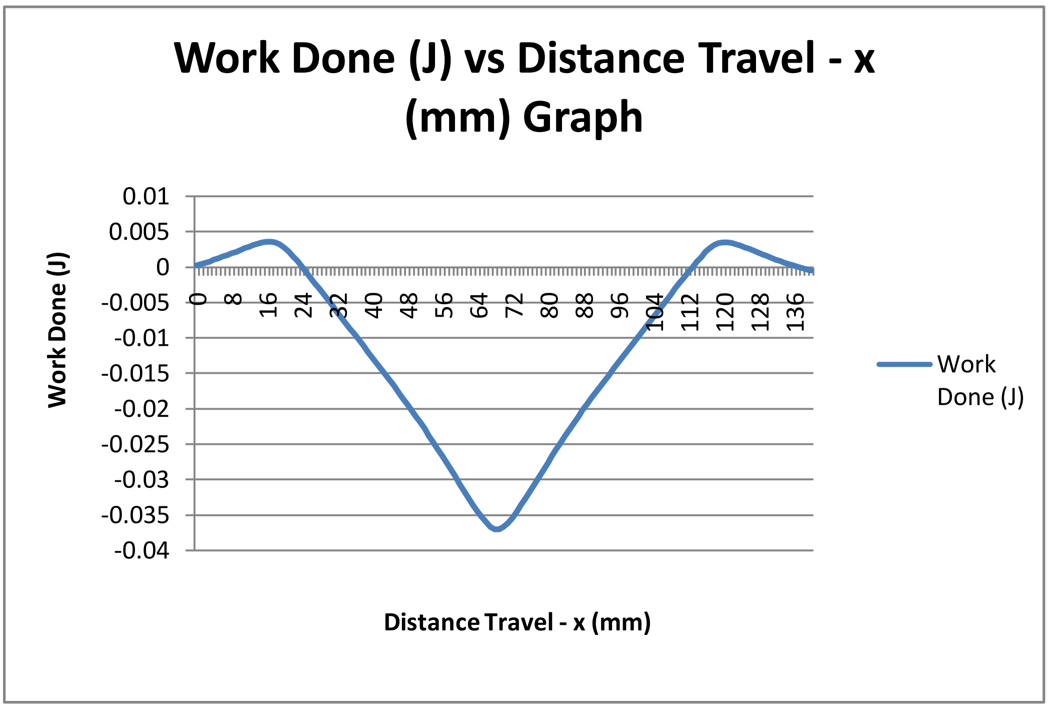

Figure 4.17: Graph Result of Work Done (J) versus Distance Travel (mm) of moveable magnet

Based on the figure 4.17 plotted work done graph result, a significant net loss of work which is approximately 0.037 (J) is occurred by calculating the collected simulated data. The Work increases initially until the travel distance around 16mm due to the magnetic attraction force between 2 magnets. The work started to decrease at the travel distance of tangentially moving magnet at around 16mm toward the axially fixed magnet. The net loss of work is reasonable because to move the moveable magnet in tangential direction, a constant force need to be applied to the magnet in order to generate equivalent work to overcome the magnetic repulsion force.

4.4.2 Comparison with Actual Experiment Result

The table 4.4 below shows the experiment result from the magnetic push-pull experiment.

Table 4.4: Result of Axial Force and Tangential Force at Various Distances

Distance(mm)	Axial Force(g)	Tangential Force(g)
40	2.2	0
35	3.0	0
30	3.7	0.2
25	5.4	0.5
20	7.0	1.1
15	12.4	1.6
10	18.6	3.7
5	24.8	5.6
1	31.2	4

The figure 4.18 below is showing the graph result plotted from the above table 4.4.

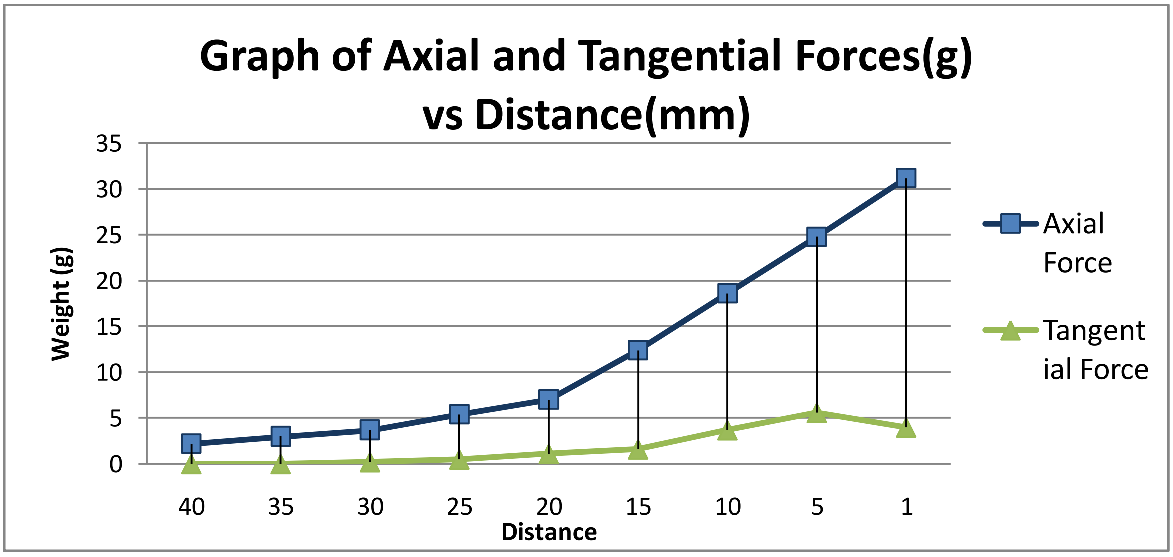

Figure 4.18: Graph Result of Axial Force and Tangential Force at corresponding Distance

The experimental result shows the axial force exerted by the repulsion force of magnets is greater than tangential force. Hence, the work generated of the axial force can be concluded is higher than the tangential. Therefore, the simulation result has fulfilled the experimental result where the work generated by the axially moving magnets is greater than the work required for the tangentially moving magnet.

4.4.3 Discussion

According to the above analysis, it is possible to think of creating an over-unity device by using the above principle. As the work generated by the axial force magnet is greater than the work needed to move the tangential actuator magnet. This concept seems a simple method of harnessing the magnetic energy from the arrangement and operational direction of magnets for producing Free Energy. The conceptual design of this free energy over-unity device can be seen from below figure 4.19.

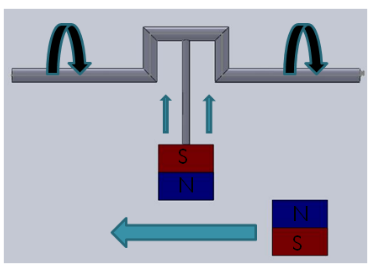

Figure 4.19: Conceptual Design of tapping Over-unity

4.5 Analysis on the Simulation of Magnetic Propulsion Experiment

4.5.1 Result, Analysis and Discussion

This simulation is to replicate and compare with the experiment of Magnetic Propulsion which is possible to tap the magnetic energy by diverting magnetic. The simulation results are as shown as below figure 4.20 and 4.21.

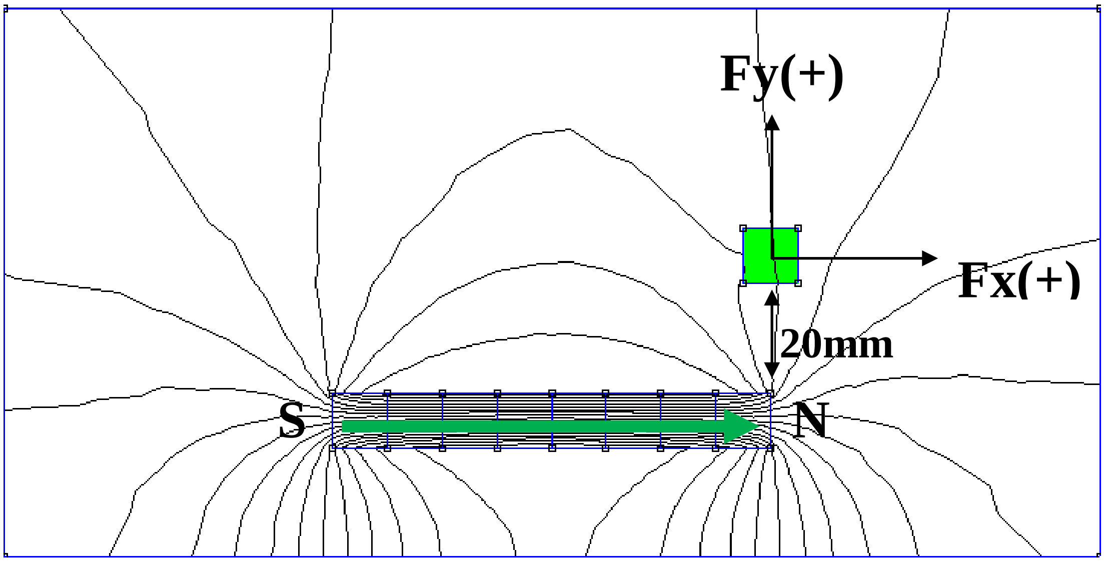

Figure 4.20: Magnetic Field Distribution for 1st Test

Reaction Force on the Steel Iron Block:

Horizontal Reaction Force, Fx: -0.0110949 N

Vertical Reaction Force, Fy: -0.194679 N

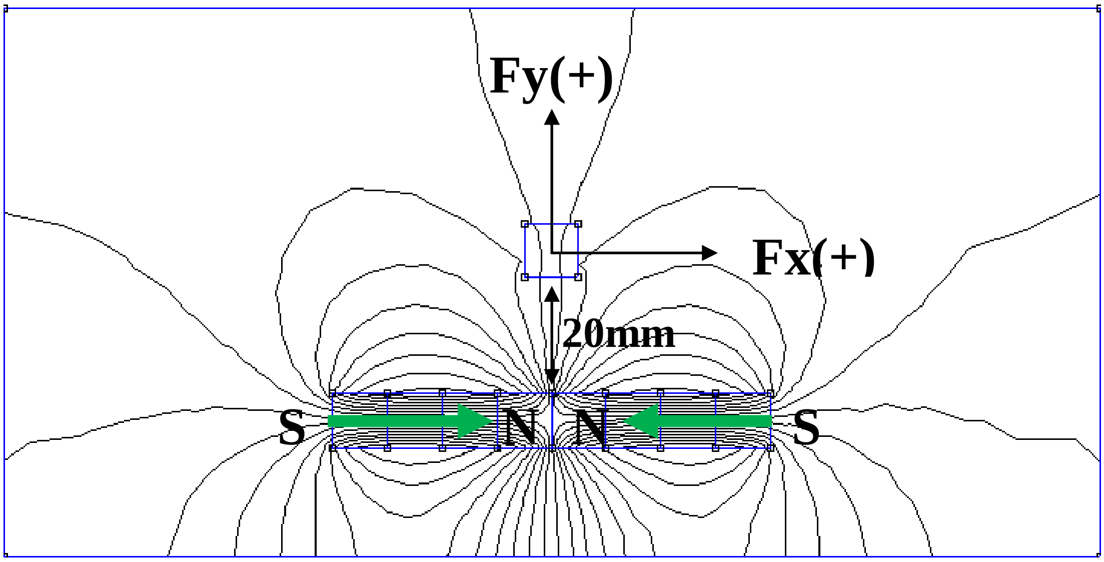

Figure 4.21: Magnetic Field Distribution for 2nd Test

Reaction Force on the Steel Iron Block:

Horizontal Reaction Force, Fx: 0.000128039 N

Vertical Reaction Force, Fy: -0.585596 N

According to the 1st Test of the simulation result, the iron steel block was endured by a Fx which is -0.0110949 N and Fy which -0.194679 N. By reversing North Pole of the last 4 magnets pointing against first 4 magnets to create repulsive configuration of the magnets as shown as figure 4.21, the iron steel block was endured by Fx of 0.000128039 N and Fy of Fy: -0.585596 N. The Steel Iron Block was actually attracted by the magnet at the same distance which is 2mm, therefore causing a Force applied to the block. If the Fx was not taken into concern, the Vertical Force which is the Fy of the 2nd Test is actually much more greater than 1st Test result. Therefore, the attraction force that applied to the steel block where of same size of magnet were in opposite direction is much more greater than the attraction force of the steel block where the same size of magnets were in same direction.

This simulation showed that it is possible to magnify the magnetic energy by adding magnetic flux. Hence, free energy devices may be able to be achieved by applying this principle to their design.

4.5.2 Comparison with Magnetic Propulsion Experiment

Table 4.5: Results of Magnetic Propulsion Experiment

	Maximum Distance before Attraction
Test 1	2mm
Test 2	1mm
Test 3	3mm

This simulation was only compared with experimental test 1 and test 3. The iron steel block distance was placed at 2mm away from the magnets and the magnetic reaction forces were extracted from the simulation. The 1st Test result was compared with test 1 of the experiment result and the 2nd Test result was compared with test 2 of the experiment result. From the simulation result, the forces exerted on the iron block of 2nd Test are greater than the 1st Test. Hence, for the experimental result, the forces exerted on iron block for test 3 would be higher than test 2 if the distance of test 3 were moved to 2mm instead of 3mm. Consequently, the magnetic energy would be magnified 2 magnets pole was aligned against each other.

4.6 Simulation on Magnet in Linear Arrangement

4.6.1 Result, Analysis and Discussion

The figure 4.22 below shows the result of the simulation. The graph of work done of the magnet A versus the travel distance was plotted in the graph result. The work done over the travel distance of magnet A was calculated by using the collected magnetic reaction forces that moved pass through the fixed magnets. Based on the graph result as shown as below figure 4.22, the cumulative work done is approximately 0.05(J) which the magnet A was travelled until the end of the linear fixed magnets arrangement.

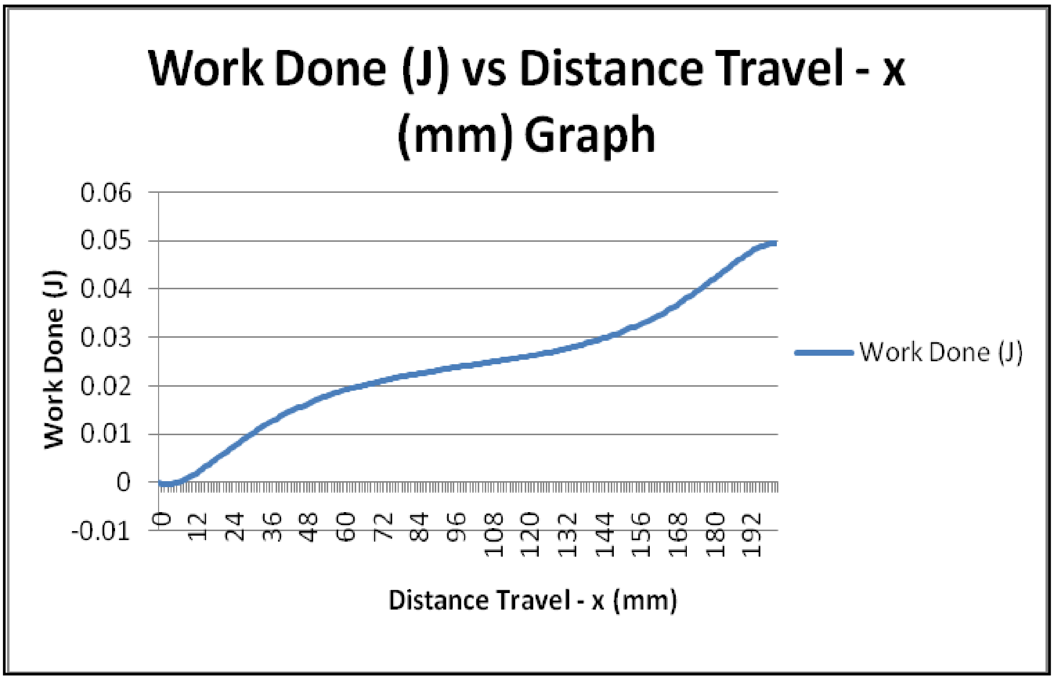

Figure 4.22: Graph Result of Work Done (J) versus Distance Travel of Magnet A

Based on the above analysis, it is obvious that the magnet A has the net gain of 0.05 (J). The net gain of work shows that the magnet A was doing positive work while travelling through the fixed magnets. The positive work indicated that the magnet A actually moved on its own without any external force applied while travelling through the linearly fixed magnets. The movement of the magnet A is due to the magnetic force which is repulsion and attraction force. The starting point of the fixed magnets and magnet A were having the same magnetic polarity which would create a repulsion force that moved the magnet A. However, the polarity between magnet A and fixed magnets were having different polarity that eventually would create an attraction force. Therefore, this configuration allows the magnet A to travel across fixed magnets without any external force applied.

A hypothesis was made based on the above analysis. If the linear configuration of the above magnet arrangement was applied in a circular arrangement, it is possible to create a continuous rotation of the motor without applying any external force.

4.6.2 Comparison with Actual Prototype in Linear Arrangement

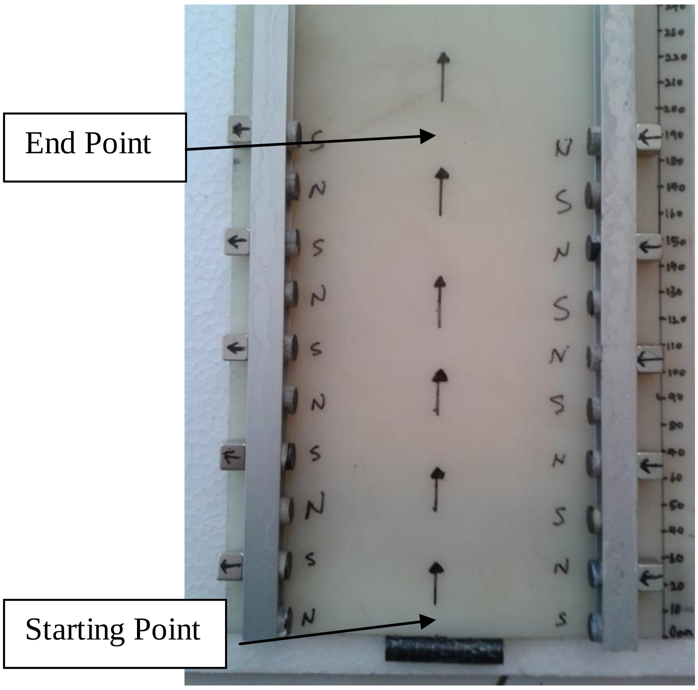

Figure 4.23: Prototype for Magnets in Linear Arrangement

Based on the observation of the above prototype as shown figure 4.23, the cylinder magnet would actually travel across the fixed magnets without any external force applied. The cylinder magnet started to accelerate until the end point of fixed magnets.

The result of the prototype was similar with the simulation where the simulation also showed a positive work done of the cylinder magnets where no external force was applied for the magnets to move forward.

4.7 Simulation on Circular Arrangement

The figure 4.24 is showing the post-processed result of the simulation. The relationship of the magnetic field distribution and flux density between the rotor and stator can be visualized in the figure.

4.7.1 Result and Analysis

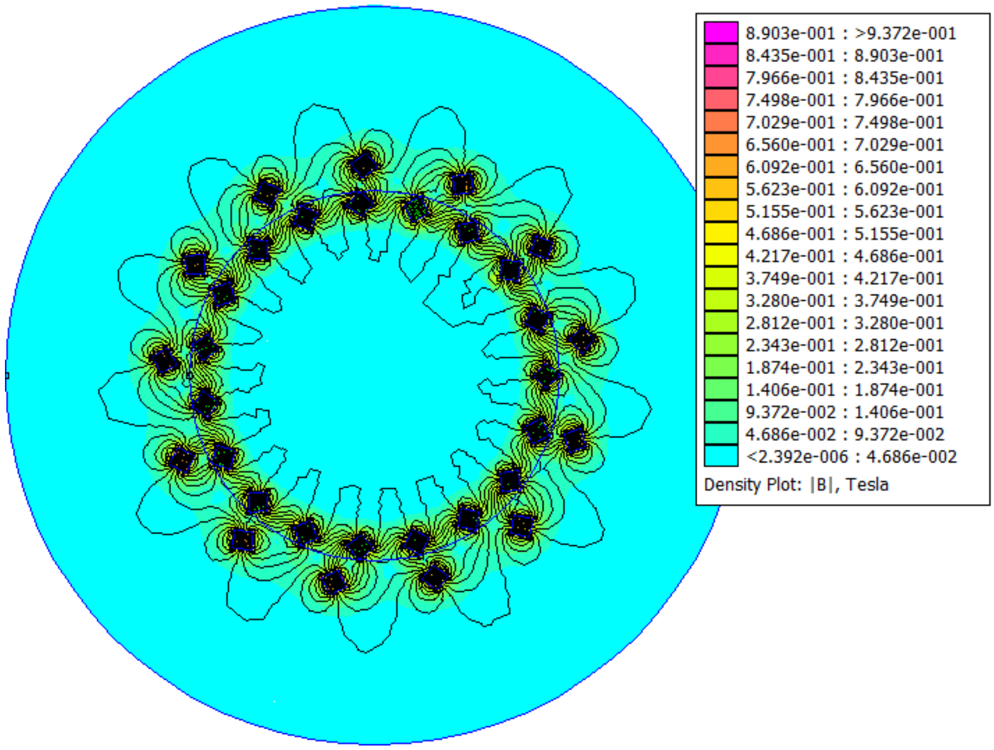

Figure 4.24: Visualization of Magnetic Field Distribution and Flux Density of Circular Arrangement of Magnets

The rotor was programmed to complete a revolution of 360° as illustrated as figure 4.24 and the torque of the rotor was extracted accordingly and the work done was calculated and plotted in a graph. The comparison of the torque and work done were illustrated as figure 4.25.

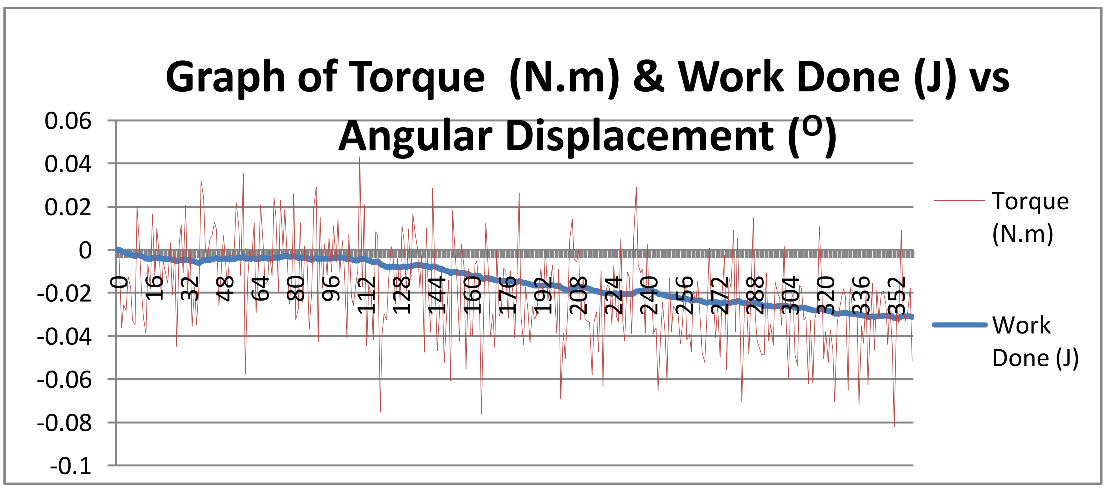

Figure 4.25: Comparison of Work Done & Torque versus the Angular Displacement of Circular Arrangement of Magnets

Based on the graph result, the work done has a net loss of approximately -0.02 Joules after complete a full revolution of 360^o which has not reached the objective of the expectation of the simulation. Obviously, the rotor was doing a negative work where external forces are needed to apply to the rotor in order to achieve a revolution of 360^o. Based on figure 4.25, the distribution of the torques values are located more on negative region than positive region. Thus, result in a negative value to the net loss in the work done.

4.7.2 Discussion

The reason that caused the net loss of work in the simulation is probably due to improper configuration of the rotor and stator magnets. Several configurations of magnets were tested throughout the simulation but the expectation of the result was negative.

However, according to some scientific reasoning, the magnetic field eventually would cancel in circular configuration. In the most cases of configuration, the rotation stops because of the magnets actuator blocks on a reversed magnetic field density. In a simple word, the magnetic field of the circular arranged magnets were linked together and would created a reversed magnetic field density that would eventually caused the rotor from rotating.

According to some conventional physics model, an external force is needed to apply for a device to returning to its start moving state. For the example, a roller coaster was started at the top of its track and released to travel downward and upward in a half-circle railway. The roller coaster cannot get back to the position where it was first released without any external force applies to it. Same principle can be applied to the circular arrangement of the magnets. If the rotor were released to rotate at some distance from some magnetic array, it can be accelerated from starting state to some other state, but it cannot complete a full rotation until the state of magnets where it was first released to be rotate if without any help of external force applied.

4.7.3 Comparison with Hardware Prototype

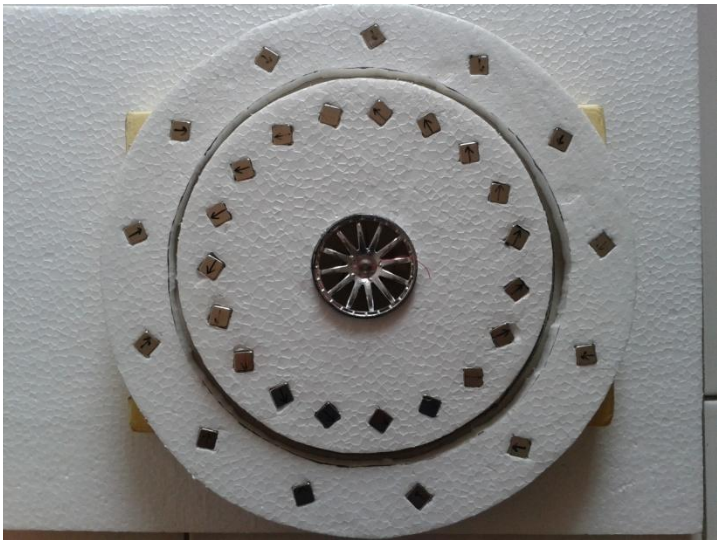

Figure 4.26: Prototype of Magnets in Circular Arrangement

The above figure 4.26 is the prototype that had been developed throughout the investigation of report. The result of the hardware was similar with the simulation result as the rotor did not rotate by itself as the work done of the simulation result is negative and external force are needed to apply to the prototype to achieve rotation.

4.8 Simulation on Linear Halbach Array Magnets Arrangement

4.8.1 Analysis, Result and Discussion

The configuration of this simulation is similar to Linear Magnets Arrangement Simulation. However, the fixed magnets were replaced with the Halbach Array Magnets Arrangement. The Figure 4.27 is showing the graph result of the simulation.

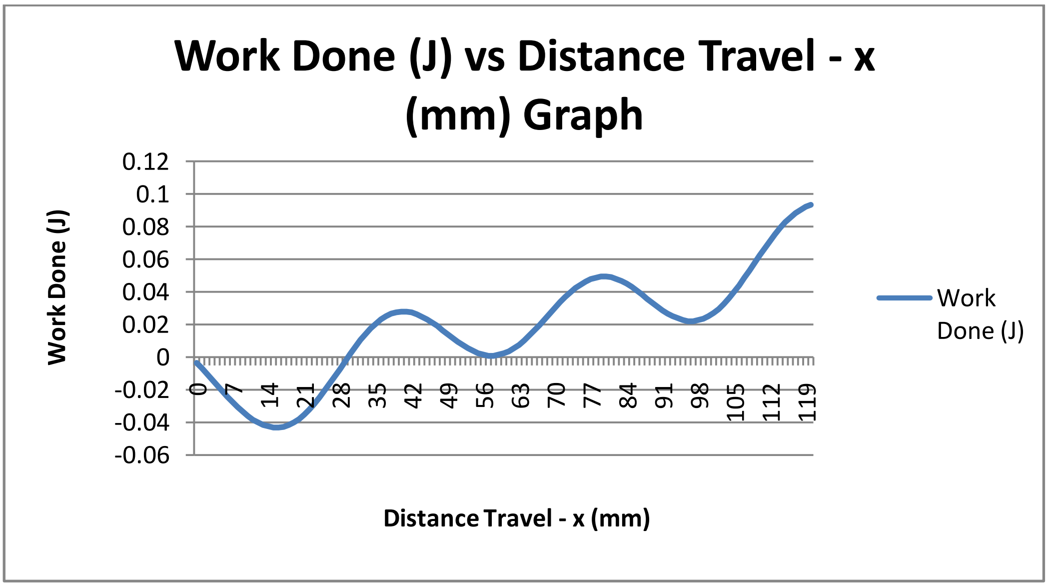

Figure 4.27: Graph Result of Work Done (J) versus Distance Travel of Magnet A

Based on the above plotted graph result, the summation of the work done after the magnet A travelled across the fixed Halbach Array Magnets is 0.09 (J). The shape of the plotted graph can be observed is having a wavy form. However, the total work done of the magnet A is still a positive value.

Based on the above analysis, it is obvious that the magnet A has the net gain of 0.09 (J). The net gain of work shows that the magnet A was doing positive work while travelling through the fixed magnets. The positive work indicated that the magnet A actually moved on its own without any external force exerted on it while travelling through the linearly fixed Halbach Array magnets. The movement of the magnet A is due to the magnetic force which is repulsion and attraction force.

The Halbach Array is a configuration of magnets which can concentrated the magnetic in one side of the linearly arrange magnets where the distribution of magnetic field of the simulation is as shown as below figure 4.28. Therefore, it can be used to increase the efficiency of the conventional motor.. The net gain of Halbach's work done which is 0.09J is higher compared with the normal linear arrangement which is 0.05J.

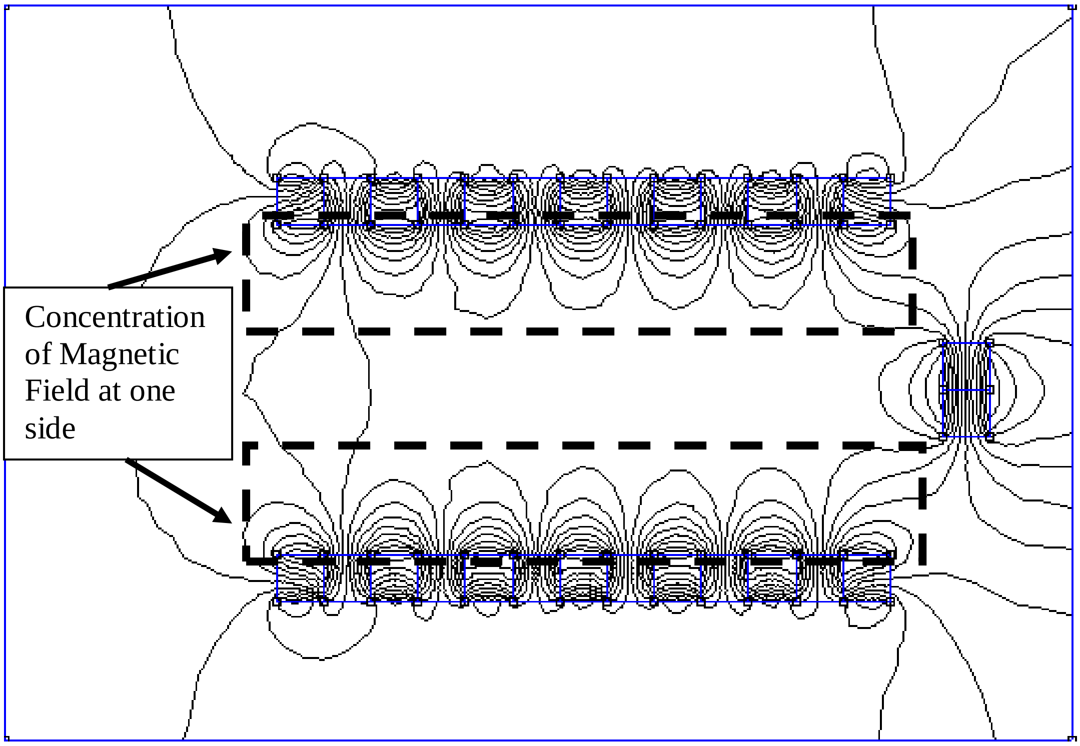

Figure 4.28: Graph Result of Work Done (J) versus Distance Travel of Magnet A

A hypothesis was made based on the above analysis. If the linear configuration of the above Halbach Array arrangement was applied in a circular arrangement, it is possible to create a continuous rotation of the motor without applying any external force. Besides that, the work done of Halbach is higher than the linear magnets configuration. Therefore, Halbach Array configuration may be able to produce more significant effect if arranged in circular formation.

4.9 Halbach Circular

The rotor was programmed to complete a revolution of 360° similar to the circular arrangement of magnets and the torque of the rotor was extracted accordingly and the work done was calculated and plotted in a graph as shown as below figure 4.30.

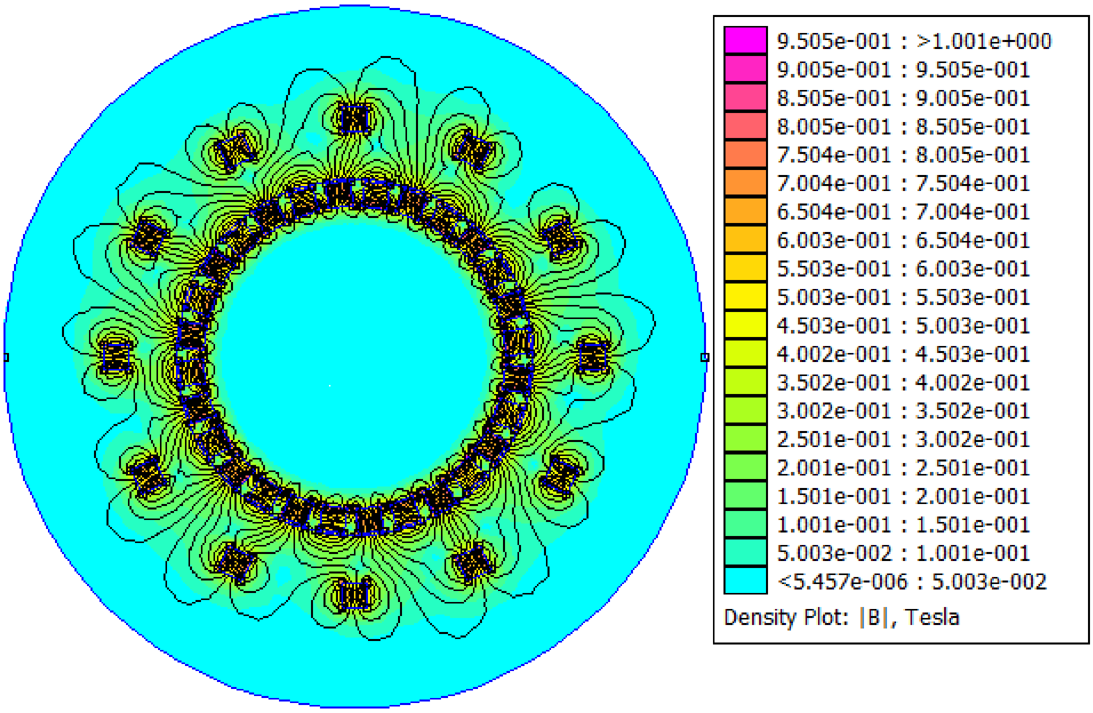

Figure 4.29: Visualization of Magnetic Field Distribution and Flux Density of Halbach Array Circular Arrangement

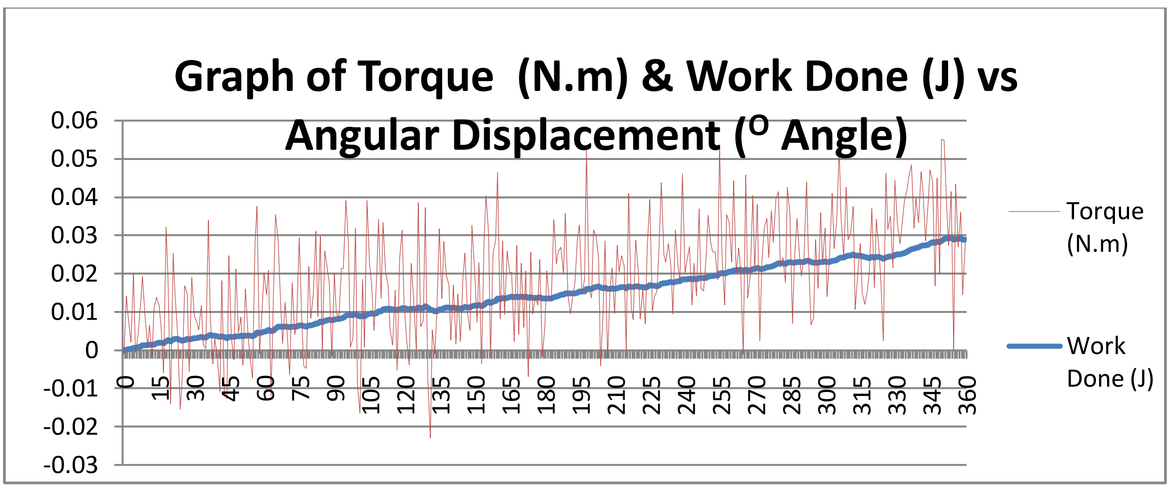

Figure 4.30: Comparison of Work Done & Torque versus the Angular Displacement of Halbach Array Circular Arrangement

Based on the graph result, the work done has a net gain of approximately 0.03 Joules after complete a full revolution of 360^{o} which surprisingly had reached the expectation of the simulation. Obviously, the rotor was doing a positive work where no external forces are needed to apply to the rotor in order to achieve a revolution of 360^{o}. Based on figure 4.30, the distribution of the torques values are located more on

positive region than negative region. Therefore, result in a net gain of 0.03(J) for work done.

4.9.1 Discussion

Based on the above analysis, the net gain of the work done was a positive feedback on the simulation of the result although the work done value is very small which 0.03 is (J) only. However, this does prove in the simulation that the rotor can rotate by its own without external force applied to the system.

The generated work done obtained from the simulation would be analyzed to justify how much of 0.03J of generated work can perform exactly. A calculation would be performed to determine how much the work it need to lid up the LED. A typical LED was chosen to be used in the calculation. The technical datasheet of the LED is as shown as below table 4.6.

Table 4.6: Technical Datasheet of Standard LED

Type	**Colour**	**I_F max.**	**V_F typ.**	**V_F max.**	**V_R max.**	**Luminous intensity**	**Viewing angle**	**Wavelength**
Standard	**Red**	**30mA**	**1.7V**	2.1V	5V	5mcd @ 10mA	60 °	660nm

I_F max. Maximum forward current
V_F typ. Typical forward voltage.
V_F max Maximum forward voltage.
V_R max Maximum reverse voltage

The maximum Power of the LED was calculated as follows:

$$\begin{aligned} P_{max} &= I_{F\ max} \times V_{F\ max} \\ &= 30mA \times 2.1V \\ &= 0.063\ (J) \end{aligned}$$

If the typical voltage was assumed to be 1.7V, the current flow through the LED was assumed to be half of the maximum rated forward current flow, the min power to lid up the LED can be calculated as follows:

$$P_{min} = I \times V_{F\,typ}$$
$$= 15mA \times 1.7V$$
$$= 0.0255\ (J)$$

Based on the above calculation, a hypothesis can be made that the 0.03J of generated work done obtained from the simulation result is able to lid up a standard type of LED as the minimum power to lid up the LED is calculated to be 0.0255 (J). However, the above calculation is only an assumption of the useful work that Circular Arrangement of Halbach Array can done. In reality or actually example, a lot of circumstances may need to be considered such as the work needs to overcome the friction of rotor, air friction and etc.

The reason of causing this positive work done phenomenon is because of the uniqueness of this array. This Halbach Array actually concentrated magnetic flux at one side as the field lines can be thought of as being somewhat superimposed. Therefore, the effect of magnetic imbalance force that causing the continuous rotation of the rotor can be assumed was enhanced by superimposed effect. This array actually would produce an even stronger magnetic field compared with the same size of magnets that did not implied with any arrangement. Moreover, the work done is possible for further improvement with a more proper design of position and angular orientation.

According to the (Creel, 2006) researches, the uniqueness of Halbach Array can be used to enhance a significant effect to some application such as levitation, particle guiders in acceleration, generator and etc. However, the application and researches of this array is still in initial starting state and a lot of knowledge were still immature and still require more researches.

4.9.2 Comparison with the Prototype

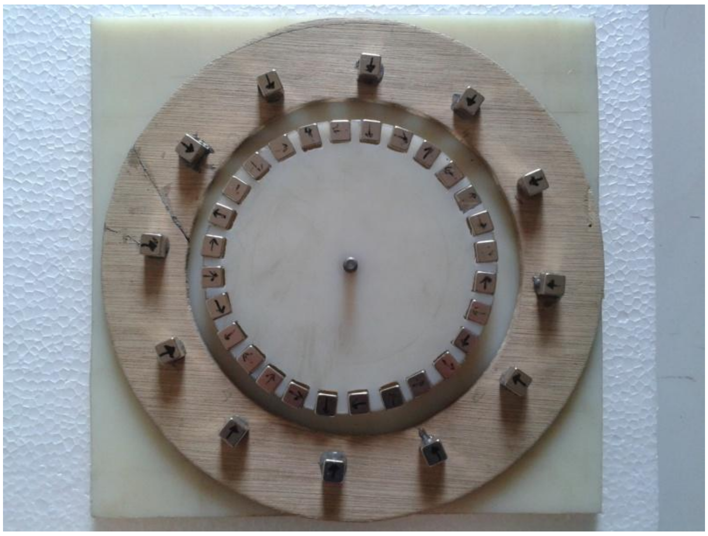

Figure 4.31: Prototype of Halbach Array in Circular

A hardware prototype of Halbach Array in circular arrangement was developed for study and research purpose. The above figure 4.31 is showing the prototype that had been built by referring to the software simulation. However, the result of the prototype is quite disappointing as the rotor was not rotate by its own and was strongly attracted with stator magnets a few certain positions. Perhaps, the reason for the negative feedback of the prototype was due to improper configuration of the components. Besides that, the prototype may need to be developed with high accuracy and low tolerance. However, the prototype was difficult to follow the exact dimension based on the simulation.

According to the simulation result, the net gain of work is only 0.03J which is very small in value. In actual case, if the net gain of work done occurred in the prototype, it would be too small and not powerful enough to rotate the rotor as the weight of the prototype was also resistance against the repulsive force between the rotor and stator.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Until the final stage of this project, the existence of free energy magnet motor can be concluded is still an uncertain fact. A lot of researches were conducted to investigate the feasibility of the free energy. Yet, the results of the researches did not provide firm evidence on proving the free energy but only provide some hypothesis and basic theories on the study on free energy. However, the simulation on Circular Arrangement of Halbach Array has produced a positive feedback to the research as the positive work done occurred in the simulation result although the value is very small. Hence, a hypothesis can be made that the motor with the configuration of Halbach can achieve continuous rotation without external forces apply. Therefore, more research and investigation can be performed on Halbach Array in future work.

Due to a lot of limitation on our investigation, it is difficult to conclude the free energy of magnet motor is existed in current state. A lot of researcher has conducted free energy research centuries ago until today, so far there is no firm and solidify evidences of free energy devices have been developed. Due to the short period of this investigation project, it is difficult for the author to come out with a firm and consolidate conclusion to prove the existence of free energy magnet motor. Besides that, a lot of issues have become great obstacles while performing the study and research, such as limitation on equipments, cost, current technology development, current possessed knowledge. Besides that, limitation on simulation software is also an issue as the simulation is developed based on formula of current Law of Physics. The Free Energy is something that contradicted Law of Physics therefore the result

of the simulation may not adaptable to the author investigation. Yet again, the suppression on the information about the Free Energy Term by the Government or Oil Company due to political issue has also one of the difficulties for the author to search for reliable information.

However, the author strongly believed that the free energy may be able to be achieved in future. As the technology is keep on developing and moving forward, the achievement of free energy may be able to reach in future technology state. Besides that, there is always no limitation in Science and the law of Physics was set up by scientists or researchers. Therefore, the law of conventional science can always be amended if there were something wrong in the law.

5.2 Recommendation for Future Work

In the future work of this project, the research and investigation of Halbach Array can be studied thoroughly as the positive feedback in our simulation result. Besides that, 3D simulation can be performed instead of 2D simulation in order to achieve a more visualized and adaptable result in 3D format. More paper research can be conducted as the information of the free energy is always keeping update with time and more experiments can be conducted in the future to solidify the theory of free energy and provide more idea in the design of prototype. Furthermore, the development of the prototype can come out with more accuracy in dimensioning as a small minor inaccuracy of the dimension may lead to unsuccessful result especially involves with the design of the arrangement of magnets. In addition, the orientation of the investigation can be lead to other field such as electromagnetic research which involves with over-unity term instead of permanent magnets which involves only with the properties of attraction and repulsion of like pole to create free energy.

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APPENDICES

APPENDIX A: Gantt Chart of Project

APPENDIX B: Experiment Result: Constant Imbalance of the Magnetic Force

"Zero" Air Gap SOUTH POLE of Armature over: Spaces (Repulsion)	Stator Magnets (Attraction)	3/8" Air Gap SOUTH POLE of Armature over: Spaces (Repulsion)	Stator Magnets (Attraction)
750	1600	875	1100
700	1450	950	1450
850	1500	950	1400
1175	1600	925	1375
950	1400	925	1350
900	1400	950	1450
950	1575	925	1350
800	1350	925	1350
1050	1550	1000	1350
1000	950	925	1100
850	1700	875	1250
800	1900	775	1275
550	1400	600	1300
11,325 Gauss	19,375 Gauss	11,800 Gauss	17,100 Gauss

30,700 Gauss (Total) | 28,700 Gauss (Total)

2,000 Gauss (Difference)

Measurements taken at the North and South poles of the armature magnet shows that there is a constant off-balance situation.

"Zero" Air Gap SOUTH POLE of Armature over: Spaces (Repulsion)	Stator Magnets (Attraction)	1/8" Air Gap SOUTH POLE of Armature over: Spaces (Repulsion)	Stator Magnets (Attraction)
925	1650	950	1250
675	2220	550	1175
600	2200	650	1150
500	2175	650	1150
375	2325	800	1150
300	2275	600	1175
525	2150	750	1150
600	2275	700	1200
450	1800	800	1100
550	1700	850	1150
575	1825	650	975
400	2050	850	1250
475	2150	675	1350
6,950 Gauss	26,775 Gauss	9,475 Gauss	15,225 Gauss

33,725 Gauss (Total) | 24,700 Gauss (Total)

9,025 Gauss (Difference)